DOCUMENTS DEPARTMENT

5/S

SAN FRANCISCO
PUBLIC LIBRARY

REFERENCE
BOOK

Not to be taken from the Library

JAN 10 1989

SAN FRANCISCO PUBLIC LIBRARY
3 1223 04611 8866

DOCUMENTS

Mission Bay

DRAFT ENVIRONMENTAL IMPACT REPORT

VOLUME TWO
Technical Analyses

CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF CITY PLANNING

86.505E

State Clearinghouse No. 86070113

Draft EIR Publication Date: August 12, 1988 Draft EIR Public Hearing Dates: September 22 and October 6, 1988

Draft EIR Public Comment Period: August 12 to October 11, 1988

REF
711.479,Sa52mb,v.2
San Francisco (Calif.).
Dept. of City Planning.
Mission Bay

SAN FRANCISCO
PUBLIC LIBRARY

88-04

3 1223 04611 8866

Mission Bay
Draft
Environmental Impact Report

TABLE OF CONTENTS BY CHAPTER

Volume			Page
One	I.	EXECUTIVE SUMMARY	I.1
	II.	HIGHLIGHTS & CONCLUSIONS	II.1
Two	III.	BACKGROUND AND AREA DESCRIPTION	III.1
	IV.	STUDY APPROACH AND ORGANIZATION	IV.1
	V.	THE EIR ALTERNATIVES AND APPROVAL PROCESS	V.1
	VI.	ENVIRONMENTAL SETTING, IMPACT AND MITIGATION	VI.A.1
	VII.	VARIATIONS ON ALTERNATIVES	VII.1
	VIII.	UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS	VIII.1
	IX.	SHORT-TERM VS. LONG-TERM IMPLICATIONS	IX.1
	X.	SIGNIFICANT ENVIRONMENTAL CHANGES	X.1
	XI.	REPORT AUTHORS AND PERSONS CONSULTED	XI.1
	XII.	DISTRIBUTION LIST	XII.1
	XIII.	BIBLIOGRAPHY AND REPORT OUTLINE	XIII.1
Three	XIV.	APPENDICES	XIV.1

DOCUMENTS DEPT.
SAN FRANCISCO
PUBLIC LIBRARY
Ref
711.479
Sa52mb
V.2

Mission Bay
Environmental Impact Report

VOLUME TWO

TABLE OF CONTENTS

Page

III. BACKGROUND AND AREA DESCRIPTION III.1

IV. STUDY APPROACH AND ORGANIZATION IV.1

V. THE EIR ALTERNATIVES AND APPROVAL PROCESS V.1

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION

A. Public Plans, Policies and Permits
- Setting VI.A.1
- Comparison with Alternatives VI.A.34
- Notes VI.A.72

B. Land Use, Business Activity and Employment
- Setting VI.B.1
- Future Context VI.B.50
- Impact VI.B.80
- Mitigation VI.B.124
- Notes VI.B.126

C. Housing and Population
- Setting VI.C.1
- Future Context VI.C.36
- Impact VI.C.64
- Mitigation VI.C.98
- Notes VI.C.99

D. Community Services and Infrastructure
- Setting VI.D.1
- Impact VI.D.32
- Mitigation VI.D.115
- Notes VI.D.121

E. Transportation
- Setting VI.E.1
- Impact VI.E.50
- Mitigation VI.E.198
- Notes VI.E.232

F. Air Quality
- Setting VI.F.1
- Impact VI.F.11
- Mitigation VI.F.23
- Notes VI.F.26

G. Noise
- Setting VI.G.1
- Impact VI.G.10
- Mitigation VI.G.30
- Notes VI.G.35

TABLE OF CONTENTS (cont'd)

Page

H. Energy

Setting VI.H.1
Impact VI.H.7
Mitigation VI.H.21
Notes VI.H.26

I. Architectural Resources and Urban Design

Setting VI.I.1
Impact VI.I.24
Mitigation VI.I.72
Notes VI.I.76

J. Cultural Resources

Setting VI.J.1
Impact VI.J.14
Mitigation VI.J.22
Notes VI.J.28

K. Geology and Seismicity

Setting VI.K.1
Impact VI.K.19
Mitigation VI.K.45
Notes VI.K.57

L. Hydrology and Water Quality

Setting VI.L.1
Impact VI.L.13
Mitigation VI.L.35
Notes VI.L.40

M. Vegetation and Wildlife

Setting VI.M.1
Impact VI.M.7
Mitigation VI.M.21
Notes VI.M.26

N. Hazardous Waste

Setting VI.N.1
Impact VI.N.18
Mitigation VI.N.39
Notes VI.N.46
O. Growth Inducement VI.O.1

VII. VARIATIONS ON ALTERNATIVES VII.1

VIII. UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS VIII.1

IX. SHORT-TERM VS. LONG-TERM IMPLICATIONS IX.1

X. SIGNIFICANT ENVIRONMENTAL CHANGES X.1

XI. REPORT AUTHORS AND PERSONS CONSULTED XI.1

XII. DISTRIBUTION LIST XII.1

XIII. BIBLIOGRAPHY AND REPORT OUTLINE XIII.1

Note: The Report Outline is a detailed list of issues and page references for each chapter of Volume Two. It may be used as an overall index for this document, or disassembled and inserted into each chapter for easy reference.

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

Table No.		Page
V.1	Mission Bay Building Space by Alternative, Build-Out/2020	V.8
V.2	Mission Bay Land Area by Alternative, Build-Out/2020	V.9
V.3	Features of the Mission Bay Alternatives	V.20
V.4	Space by Use in Initial Phase of Mission Bay Development, Alternatives A and B	V.33
V.5	Space by Use, by Alternative, 2000 and Build-Out/2020	V.34
V.6	Mission Bay Employment by Use, by Alternative, 2000 and Build-Out/2020	V.35
V.7	Mission Bay Households and Population, by Alternative, 2000 and Build-Out/2020	V.39
VI.A.1	Consistency of Mission Bay EIR Alternatives with the Central Waterfront Plan	VI.A.35
VI.A.2	Relationship Between Mission Bay Alternatives and Objectives and Policies of the San Francisco Master Plan	VI.A.48
VI.A.3	Summary of San Francisco Agency Authority, Mission Bay	VI.A.67
VI.A.4	Required Regional, State and Federal Agency Permits for Mission Bay, by Alternative	VI.A.69
VI.B.1	Mission Bay Land Area, by Use, 1985	VI.B.3
VI.B.2	Mission Bay Building Space and Land Area Used by Businesses, by Business Activity, 1985	VI.B.5
VI.B.3	Mission Bay Establishments and Employment, by Business Activity, 1985	VI.B.6
VI.B.4	Mission Bay Rail Freight Users, by Business Activity, 1985	VI.B.9
VI.B.5	Mission Bay Maritime-Related Establishments and Employment, by Business Activity, 1985	VI.B.10
VI.B.6	Space in the Downtown & Vicinity, Excluding Mission Bay, by Use, 1985	VI.B.15

LIST OF TABLES (cont'd)

Table No.		Page
VI.B.7	Employment in the Downtown & Vicinity, Excluding Mission Bay, by Business Activity, 1985	VI.B.16
VI.B.8	Employment in the Downtown & Vicinity, by Subarea, 1985	VI.B.17
VI.B.9	Comparison of Employment in the Downtown & Vicinity to Citywide Employment, 1985	VI.B.18
VI.B.10	San Francisco Employment by Standard Industrial Classification, 1985	VI.B.20
VI.B.11	Bay Area Employment by County, 1985	VI.B.21
VI.B.12	Occupation and Wage/Salary Distributions for Jobs in Mission Bay, 1985	VI.B.39
VI.B.13	Occupation and Wage/Salary Distributions for Jobs in the Downtown & Vicinity, Excluding Mission Bay, 1985	VI.B.41
VI.B.14	Comparison of the Distribution of Jobs by Occupation for the Downtown & Vicinity and the Rest of the City, 1985	VI.B.44
VI.B.15	Sources of Labor for San Francisco Jobs, 1985	VI.B.46
VI.B.16	Region's Employed Residents and Propensity to Work in San Francisco, 1985	VI.B.47
VI.B.17	Employment Scenarios for the Downtown & Vicinity, by Business Activity, 1985 and 2000	VI.B.54
VI.B.18	Employment Scenarios for the Downtown & Vicinity, Excluding Mission Bay, by Business Activity, 1985 and 2000	VI.B.55
VI.B.19	Employment Scenarios for the Downtown & Vicinity, by Subarea, 1985 and 2000	VI.B.58
VI.B.20	Space in the Downtown & Vicinity, by Use, 1985 and 2000	VI.B.61
VI.B.21	Space in the Downtown & Vicinity, Excluding Mission Bay, by Use, 1985 and 2000	VI.B.62
VI.B.22	San Francisco Employment, 1985 and 2000	VI.B.64
VI.B.23	Employment in the Rest of the Region, 1985 and 2000	VI.B.70
VI.B.24	Employment Scenarios for the Downtown & Vicinity, by Business Activity, 1985, 2000 and Build-Out/2020	VI.B.71

LIST OF TABLES (cont'd)

Table No.		Page
VI.B.25	Employment Scenarios for the Downtown & Vicinity, Excluding Mission Bay, by Business Activity, 1985, 2000 and Build-Out/2020	VI.B.73
VI.B.26	Employment Scenarios for the Downtown & Vicinity, by Subarea, 1985, 2000 and Build-Out/2020	VI.B.75
VI.B.27	San Francisco Employment, 1985, 2000 and Build-Out/2020	VI.B.77
VI.B.28	Employment in the Rest of the Region, 1985, 2000 and Build-Out/2020	VI.B.79
VI.B.29	Occupation and Wage/Salary Categories for Jobs in Mission Bay, by Alternative, 1985 and 2000	VI.B.84
VI.B.30	Occupation and Wage/Salary Categories for Jobs in Mission Bay, by Alternative, 1985, 2000 and Build-Out/2020	VI.B.86
VI.B.31	Mission Bay Construction Employment Through Build-Out, by Alternative	VI.B.90
VI.C.1	San Francisco Population, Employed Population, Households, and Housing Units, 1970, 1980 and 1985	VI.C.8
VI.C.2	Comparison of Demographic Characteristics for San Francisco and the Rest of the Region, 1980	VI.C.10
VI.C.3	Comparison of Population, Employed Population, Households, and Housing Units in the Downtown & Vicinity to Citywide Totals, 1980 and 1985	VI.C.12
VI.C.4	Comparison of Demographic Characteristics for the Downtown & Vicinity and the Total City, 1980	VI.C.14
VI.C.5	San Francisco Jobs and Employed Residents, 1970, 1981 and 1985	VI.C.28
VI.C.6	Residence Patterns for Workers in the Downtown & Vicinity, 1981 and 1985	VI.C.30
VI.C.7	Residence Patterns Within San Francisco of Workers in the Downtown & Vicinity, 1981 and 1985	VI.C.33
VI.C.8	Places of Work for Employed Residents of the Downtown & Vicinity, 1980/81 and 1985	VI.C.35
VI.C.9	San Francisco Housing Units, Households, Population, and Employed Population, 1985 and 2000	VI.C.39

LIST OF TABLES (cont'd)

Table No.		Page
VI.C.10	Rest of Region Population and Employed Population, 1985 and 2000	VI.C.45
VI.C.11	San Francisco Housing Units, Households, Population, and Employed Population, 1985, 2000 and Build-Out/2020	VI.C.47
VI.C.12	Rest of Region Population and Employed Population, 1985, 2000 and Build-Out/2020	VI.C.50
VI.C.13	San Francisco Jobs and Employed Residents, 1981, 1985, 2000 and Build-Out/2020	VI.C.54
VI.C.14	Relationship Between Jobs in San Francisco and the Region's Employed Residents, 1981, 1985, 2000 and Build-Out/2020	VI.C.56
VI.C.15	Residence Patterns of Workers in the Downtown & Vicinity, 1981, 1985 and 2000	VI.C.58
VI.C.16	Residence Patterns of Workers in the Downtown & Vicinity, 1985, 2000 and Build-Out/2020	VI.C.61
VI.C.17	Consideration of Office Affordable Housing Production Program (OAHPP) Requirements, by Alternative, Build-Out/2020	VI.C.71
VI.C.18	Comparison of the Estimated Increase in San Francisco Households with Project Area Workers and Housing Units Added in Mission Bay, by Alternative, Build-Out/2020	VI.C.72
VI.C.19	Consideration of Housing Affordability: Additional San Francisco Households with Project Area Workers and New Housing Added in Mission Bay, by Alternative, Build-Out/2020	VI.C.73
VI.C.20	Consideration of Office Affordable Housing Production Program (OAHPP) Requirements, by Alternative, 2000	VI.C.78
VI.C.21	Comparison of the Estimated Increase in San Francisco Households with Project Area Workers to Housing Units Added in Mission Bay and Consideration of Housing Affordability, by Alternative, 2000	VI.C.79
VI.C.22	Workers in the Downtown & Vicinity by Place of Residence as a Percent of Employed Population in Each Place, 1981, 1985, 2000 and Build-Out/2020	VI.C.95

LIST OF TABLES (cont'd)

Table No.		Page
VI.D.1	Project Area Fire Department Personnel Requirements, by Alternative, 2000 and 2020	VI.D.35
VI.D.2	Projected Number of Fire and Non-Fire Incidents in the Project Area, by Alternative, 1985 and 2000	VI.D.37
VI.D.3	Projected Number of Fire and Non-Fire Incidents in the Project Area, by Alternative, 2000 and 2020	VI.D.40
VI.D.4	Projected Police Incidents in the Project Area, 1985 and 2000	VI.D.43
VI.D.5	Estimated Project Area Police Department Personnel, by Alternative, 1985, 2000, and 2020	VI.D.44
VI.D.6	Projected Number of Police Incidents in the Project Area, 2000 and 2020	VI.D.47
VI.D.7	Estimates of Project Area Public School Students by Grade Level and Comparison to Citywide Public School Enrollment, by Alternative, 2000	VI.D.52
VI.D.8	Estimated Classrooms, Schools and Teachers/Staff Required to Serve Project Area Public School Students, Alternatives A and B, 2000	VI.D.53
VI.D.9	Estimates of Project Area Public School Students by Grade Level and Comparison to Citywide Public School Enrollment, by Alternative, 2000 and Build-Out (2020)	VI.D.57
VI.D.10	Estimated Classrooms, Schools and Teachers/Staff Required to Serve Project Area Public School Students, Alternatives A and B, 2000 and Build-Out (2020)	VI.D.58
VI.D.11	Project Area Open Space by Alternative, 1985 and 2000	VI.D.66
VI.D.12	Project Area Recreation and Open Space Features of Alternatives, Year 2000	VI.D.67
VI.D.13	Estimated Project Area Open Space and Recreation Personnel Requirements, by Alternative, 1985 and 2000	VI.D.69
VI.D.14	Comparison of Estimated Project Area Open Space Demand to Open Space, by Alternative, Year 2000	VI.D.71
VI.D.15	Project Area Open Space by Alternative, 1985, 2000 and Build-Out/2020	VI.D.77

LIST OF TABLES (cont'd)

Table No.		Page
VI.D.16	Additional Project Area Recreation and Open Space Features Provided after Year 2000, by Alternative, Build-Out/2020	VI.D.78
VI.D.17	Estimated Project Area Open Space and Recreation Personnel Requirements, by Alternative, 1985, 2000 and Build-Out/2020	VI.D.80
VI.D.18	Comparison of Total Estimated Project Area Open Space Demand to Parkland, by Alternative, Build-Out/2020	VI.D.81
VI.D.19	Relationship Between Mission Bay Alternatives and Open Space Objectives and Policies of the Recreation and Open Space Element, Central Waterfront Plan and BCDC Special Area Plan for the San Francisco Waterfront, 2000 and Build-Out/2020	VI.D.87
VI.D.20	Estimated Annual City Ambulance Responses and Paramedic and Vehicle Requirements for the Project Area, by Alternative, 1985 and 2000	VI.D.96
VI.D.21	Estimated Annual City Ambulance Responses and Paramedic and Vehicle Requirements for the Project Area, by Alternative, 2000 and Build-Out/2020	VI.D.99
VI.D.22	Mission Bay Water Demand, by Alternative, 1985, 2000 and 2020	VI.D.101
VI.D.23	Estimated Project Area Sanitary Sewage Generation, by Alternative, 2000 and 2020	VI.D.104
VI.D.24	Estimated Project Area Annual Solid Waste Generation, by Alternative, 1985, 2000 and 2020	VI.D.109
VI.E.1	Primary and Secondary Freeway Access Points	VI.E.4
VI.E.2	1985 Intersection Levels of Service	VI.E.12
VI.E.3	1985 Ridership and Capacity for MUNI Routes Serving the Project Area	VI.E.17
VI.E.4	Trends in Rail Freight Carloadings	VI.E.28
VI.E.5	Pedestrian Flow Levels	VI.E.30
VI.E.6	1985 Outbound Transit Ridership and Capacity at Screenlines	VI.E.35
VI.E.7	Percentages of Person Trips by Mode Outbound from Downtown & Vicinity, 1985, 2000 and 2020	VI.E.77

LIST OF TABLES (cont'd)

Table No.		Page
VI.E.8	Percentage Increases in Outbound P.M. Peak–Period and Peak–Hour Travel Demand from Downtown & Vicinity, 2000 and 2020	VI.E.81
VI.E.9	Highway Travel Demand at Regional Screenlines, 1985 and 2000, After Modal Shifts	VI.E.86
VI.E.10	P.M. Peak Period and P.M. Peak Hour Highway Volumes at Screenlines, 1985 and 2000	VI.E.87
VI.E.11	P.M. Peak Period Outbound Transit Riders at Screenlines, 1985 and 2000	VI.E.94
VI.E.12	P.M. Peak Hour Outbound Transit Riders at Screenlines, 1985 and 2000	VI.E.96
VI.E.13	Cumulative Outbound Transit Demand and Capacity at Screenlines, 2000	VI.E.98
VI.E.14	P.M. Peak Period and P.M. Peak Hour Highway Volumes at Screenlines, 1985 and 2000	VI.E.106
VI.E.15	P.M. Peak Period and P.M. Peak Hour Highway Volumes at Screenlines, 2000 and 2020	VI.E.108
VI.E.16	P.M. Peak Period Outbound Transit Riders at Screenlines, 1985 and 2020	VI.E.115
VI.E.17	P.M. Peak Hour Outbound Transit Riders at Screenlines, 1985 and 2000	VI.E.117
VI.E.18	P.M. Peak Period Outbound Transit Riders at Screenlines, 2000 and 2020	VI.E.119
VI.E.19	P.M. Peak Hour Outbound Transit Riders at Screenlines, 2000 and 2020	VI.E.121
VI.E.20	Cumulative Outbound Transit Demand and Capacity at Screenlines, 2020	VI.E.130
VI.E.21	Percent Increases in Transit Capacity Required Between 2000 and 2020 to Satisfy Load Policies	VI.E.132
VI.E.22	Percent Increases in Transit Capacity Required Between 2000 and 2020 for Same Levels of Service as in 2000	VI.E.134
VI.E.23	P.M. Peak Hour Intersection Levels of Service, 1985 and 2000	VI.E.144

LIST OF TABLES (cont'd)

Table No.		Page
VI.E.24	Cumulative Demand and Capacity for MUNI Routes Serving the Project Area, 2000	VI.E.150
VI.E.25	Projected Off-Street Parking Demand and Supply, 2000	VI.E.160
VI.E.26	P.M. Peak Hour Intersection Levels of Service, 1985, 2000 and 2020	VI.E.167
VI.E.27	Cumulative Demand and Capacity for MUNI Routes Serving the Project Area, 2020	VI.E.177
VI.E.28	Percentage Increases in Capacity Required for 2020 Level of Service to Be Similar to that in 2000	VI.E.179
VI.E.29	Projected Off-Street Parking Demand and Supply, 2020	VI.E.185
VI.E.30	Estimated MUNI Service Increases Required to Meet MUNI Load Factor Standards in 2020	VI.E.220
VI.F.1	Project Area and County Emissions, 1985	VI.F.8
VI.F.2	Worst-Case Carbon Monoxide Concentrations at Selected Intersections, 1985	VI.F.9
VI.F.3	Net Increase in Vehicular Emissions within San Francisco County for the Project Area, by Alternative, 2000 and Build-Out/2020	VI.F.14
VI.F.4	Estimated Worst-Case Carbon Monoxide Concentrations at Selected Intersections, by Alternative, 1985, 2000 and Build-Out/2020	VI.F.18
VI.G.1	Existing 24-Hour Average Noise Levels in the Project Area, 1985	VI.G.6
VI.G.2	Objectives of San Francisco Plan for Transportation Noise Control	VI.G.9
VI.G.3	Typical Noise Levels During Construction of Large Buildings	VI.G.12
VI.G.4	Typical Noise Levels from Selected Construction Equipment	VI.G.13
VI.G.5	Estimated Composite Afternoon, Peak-Hour Traffic Noise Levels (dBA, L_{eq}) on Selected Road Segments, by Alternative, 1985 and Build-Out/2020	VI.G.20

LIST OF TABLES (cont'd)

Table No.		Page
VI.H.1	Annual Project Area Operational Energy Consumption by Alternative, 1985 and 2000	VI.H.10
VI.H.2	Annual Project Area Operational Energy Consumption by Alternative, 1985 and Build-Out/2020	VI.H.12
VI.H.3	Peak Electrical Demand by Alternative, 2000 and Build-Out/2020	VI.H.14
VI.H.4	Annual Transportation Energy Consumption by Alternative, 1985 and 2000	VI.H.17
VI.H.5	Annual Transportation Energy Consumption by Alternative, Build-Out/2020	VI.H.19
VI.I.1	Architectural Resources in Project Vicinity	VI.I.3
VI.I.2	Relationship Between Applicable Urban Design Policies of the Master Plan and Mission Bay Alternatives at Build-Out	VI.I.19
VI.I.3	Project Area Shadow Conditions, Maximum Building Heights and 40-Foot Building Heights, Alternative A, Build-Out/2020	VI.I.59
VI.I.4	Project Area Shadow Conditions, Maximum Building Heights and 40-Foot Building Heights, Alternative B, Build-Out/2020	VI.I.64
VI.I.5	Project Area Shadow Conditions, Maximum Building Heights and 40-Foot Building Heights, Alternative N, Build-Out/2020	VI.I.68
VI.K.1	Amount of Material Excavated and/or Dredged, by Alternative	VI.K.20
VI.K.2	Foundation Types Which May Be Used at Mission Bay	VI.K.28
VI.K.3	Building Types Which May Be Used at Mission Bay	VI.K.36
VI.K.4	Population at Mission Bay Subject to Seismic Hazard	VI.K.38
VI.L.1	Runoff to Storm Drains Generated by Alternatives, 1985 and Build-Out/2020	VI.L.16
VI.N.1	Permitted Hazardous Waste Facilities In or Near the Project Area	VI.N.15
VI.N.2	Hazardous Materials Likely to Be Encountered in the Project Area	VI.N.19

LIST OF TABLES (cont'd)

Table No.		Page
VI.N.3	Preferred Treatment Processes for Hazardous Wastes	VI.N.29
VI.I.1	Levels of Transit Service with No CalTrain Terminal Relocation	VII.53

LIST OF FIGURES

Figure No.		
III.1	Location of Project Area in Bay Area Region	III.2
III.2	Subareas of Mission Bay	III.7
III.3	Mission Bay Project Area Land Ownership	III.9
IV.1	Subareas of Downtown and Vicinity	IV.5
IV.2	Nearby Areas	IV.6
V.1	Alternative A Land Use Plan-Build-Out/2020	V.12
V.2	Alternative B Land Use Plan-Build-Out/2020	V.14
V.3	Alternative N Land Use Plan-Build-Out/2020	V.18
V.4	Alternative A Land Use Plan-2000	V.30
V.5	Alternative B Land Use Plan-2000	V.31
V.6	Alternative N Land Use Plan-2000	V.32
VI.A.1	Central Waterfront Plan and Northeastern Waterfront Plan Areas	VI.A.3
VI.A.2	Area Plans and Proposals for Citizen Review Affecting Nearby Areas	VI.A.7
VI.A.3	Port Jurisdiction and BCDC San Francisco Special Area Plan	VI.A.17
VI.B.1	General Project Area Land Use	VI.B.4
VI.C.1	San Francisco Residential Districts	VI.C.32
VI.D.1	Fire Service	VI.D.2
VI.D.2	Police Department Districts and Reporting Areas	VI.D.7
VI.D.3	Existing Recreation and Open Space	VI.D.12

LIST OF FIGURES (cont'd)

Figure No.		Page
VI.D.4	Existing Water Lines	VI.D.23
VI.D.5	Major Sewer Lines	VI.D.27
VI.D.6	Alternative A Open Space	VI.D.62
VI.D.7	Alternative B Open Space	VI.D.63
VI.D.8	Alternative N Open Space	VI.D.64
VI.E.1	Regional Transportation Facilities Serving the Downtown & Vicinity	VI.E.3
VI.E.2	Pattern of One-Way and Two-Way Streets in and Near the Project Area	VI.E.5
VI.E.3	1985 P.M. Peak-Hour Traffic Volumes	VI.E.9
VI.E.4	MUNI Bus and Metro Services in Mission Bay and the Adjacent Areas	VI.E.15
VI.E.5	Rail Trackage in San Francisco	VI.E.21
VI.E.6	Rail Freight Facilities in the Project and Adjacent Areas	VI.E.23
VI.E.7	Geographic Areas Used to Describe Rail Freight Volumes	VI.E.26
VI.E.8	MUNI and Regional Screenlines	VI.E.33
VI.E.9	Alternative A MUNI Services - 2000 and Build-Out/2020	VI.E.64
VI.E.10	Alternative B MUNI Services - 2000 and Build-Out/2020	VI.E.65
VI.E.11	Alternative A Project Area Streets - 2000	VI.E.141
VI.E.12	Alternative B Project Area Streets - 2000	VI.E.142
VI.E.13	Alternative N Project Area Streets - 2000	VI.E.143
VI.E.14	Alternative A Rail Trackage - 2000	VI.E.155
VI.E.15	Alternative B Rail Trackage - 2000	VI.E.157
VI.E.16	Alternative A Project Area Streets - Build-Out/2020	VI.E.170
VI.E.17	Alternative B Project Area Streets - Build-Out/2020	VI.E.171
VI.E.18	Alternative N Project Area Streets - Build-Out/2020	VI.E.172
VI.E.19	Alternative A Rail Trackage - Build-Out/2020	VI.E.180

LIST OF FIGURES (cont'd)

Figure No.		Page
VI.E.20	Alternative B Rail Trackage - Build-Out/2020	VI.E.181
VI.G.1	Land Use Compatibility Chart for Community Noise	VI.G.4
VI.G.2	Locations of 24-Hour Noise Measurements	VI.G.5
VI.I.1	Architectural Resources Within Project Area and Vicinity	VI.I.2
VI.I.2	View of Mission Bay Project Area From Potrero Hill	VI.I.8-9
VI.I.3	Existing Views 1. Third and Townsend Streets 2. Berry Street Near Fourth Street 3. China Basin Channel Near Fourth Street	VI.I.12-13
VI.I.4	Existing Views 4. Third, Fourth and Mission Rock Streets 5. Former Southern Pacific Railyards 6. Owens Street North of 16th Street	VI.I.16-17
VI.I.5	Mission Bay Height Limits - View From Potrero Hill	VI.I.28-29
VI.I.6	Illustration of Alternatives - Viewpoint 1: Third and Townsend Street	VI.I.38-39
VI.I.7	Illustration of Alternatives - Viewpoint 2: Berry Street Near Fourth Street	VI.I.42-43
VI.I.8	Illustration of Alternatives - Viewpoint 3: China Basin Channel Near Fourth Street	VI.I.46-47
VI.I.9	Illustration of Alternatives - Viewpoint 4: Third, Fourth and Mission Rock Streets	VI.I.48-49
VI.I.10	Illustration of Alternatives - Viewpoint 5: Former Southern Pacific Railyards	VI.I.52-53
VI.I.11	Illustration of Alternatives - Viewpoint 6: Owens Street North of 16th Street	VI.I.54-55
VI.I.12	Alternative A Open Space	VI.I.58
VI.I.13	Alternative B Open Space	VI.I.63
VI.I.14	Alternative N Open Space	VI.I.67
VI.J.1	Cultural Resources Potential	VI.J.17
VI.K.1	Plot Plan Showing Locations of Subsurface Profiles	VI.K.3

LIST OF FIGURES (cont'd)

Figure No.		Page
VI.K.2	Subsurface Profile Along Section A-A'	VI.K.4
VI.K.3	Subsurface Profile Along Section B-B'	VI.K.5
VI.K.4	Thickness of Bay Mud	VI.K.6
VI.K.5	Bedrock Contours	VI.K.8
VI.K.6	Expected Settlement in Next 30 Years, Dock Height Fills and Pile-Supported Structures	VI.K.9
VI.K.7	Major Bay Area Faults	VI.K.12
VI.K.8	Alternative A Foundation Types	VI.K.25
VI.K.9	Alternative B Foundation Types	VI.K.26
VI.K.10	Alternative N Foundation Types	VI.K.27
VI.N.1	Progression of Fill	VI.N.6
VI.N.2	Miscellaneous Historic Hazards - Sensitive Industrial Uses in the Mission Bay Project Area by Parcel	VI.N.22
VI.N.3	Historic Oil Industry Uses in the Mission Bay Project Area by Parcel	VI.N.30
VI.N.4	Historic Rail-Related Uses in the Mission Bay Project Area by Parcel	VI.N.24
VII.1	Housing Development (Alternative N)	VII.2
VII.2	Port-Priority Retention (Alternative B)	VII.11
VII.3	Reduced Housing Density (Alternative B)	VII.20
VII.4	Replacement of Some S/LI/RD with Personal and Business Service Space and Increased Retail and Community Facilities (Alternative A)	VII.25
VII.5	Replacement of Some S/LI/RD with Office (Alternative A)	VII.33
VII.6	Increased Housing Height (Alternative B)	VII.38
VII.7	View from Potrero Hill - Increased Housing Heights (Alternative B)	VII.40

III. BACKGROUND AND AREA DESCRIPTION

LOCATION IN CITY AND REGION

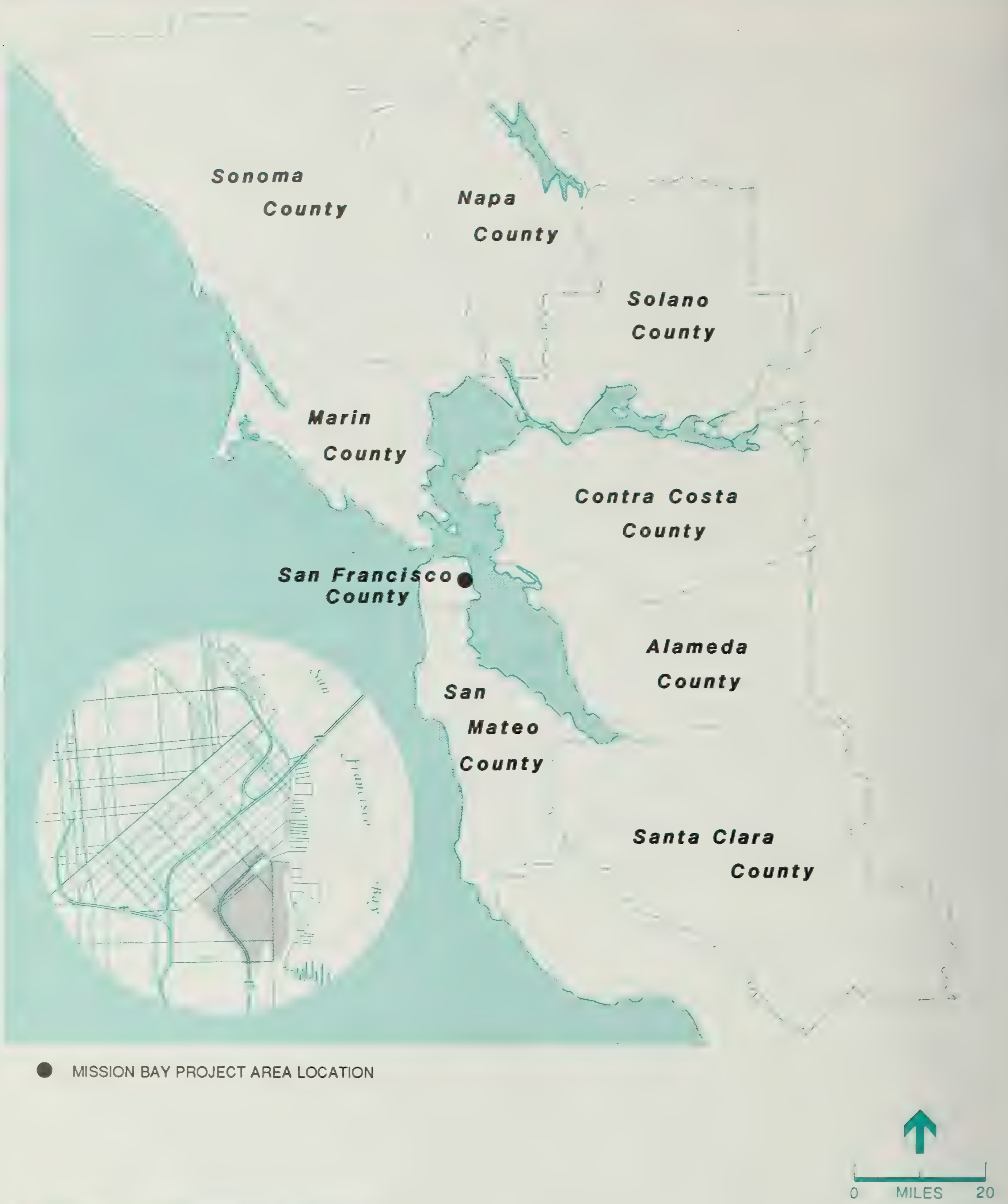
The Mission Bay Project Area encompasses approximately 325 acres (about one-half square mile) near the eastern shoreline of San Francisco, approximately one mile south of the City's downtown financial district. The Project Area is entirely within the City and County of San Francisco, which is located at the northern end of the San Mateo Peninsula, near the center of the nine-county Bay Area. The Project Area is bounded generally by Townsend Street on the north, Seventh and Pennsylvania Streets on the west, Mariposa Street on the south, and China Basin Street and Third Streets on the east./1/ Figure III.1 shows the location of Mission Bay in the Bay Area, and the inset shows the location of Mission Bay within San Francisco.

San Francisco is connected to Marin County by the Golden Gate Bridge (U.S. 101) and to Alameda County by the Bay Bridge (I-80). Regional access to the Project Area is provided by the I-280 Freeway, which terminates just north of the Project Area at Sixth and Brannan Streets and in the Project Area at Fourth and Berry Streets, the I-80 James Lick Freeway about one-quarter mile north, U.S. 101 Bayshore Freeway about one-half mile west, the CalTrain (Peninsula Rail Service) terminal at Fourth and Townsend Streets, and the San Francisco Municipal Railway (MUNI) with one trolley and six diesel bus routes connecting to major regional transit terminals in downtown San Francisco.

HISTORY OF THE PROJECT AREA

EARLY DEVELOPMENT OF MISSION BAY

Most of the Project Area was originally a shallow, wide-mouthed bay called Mission Bay. Mission Bay covered about 260 acres, extending from the then-prominent landforms of Steamboat Point on the north near Third and King Streets to Point San Quentin in the south near Third and 16th Streets. Mission Creek flowed into Mission Bay near the present intersection of Division, King and DeHaro Streets. Figure VI.N.1, p. VI.N.6, shows the original shoreline in 1857 compared to the present shoreline. By the 1850's, shipyards and other industrial uses existed near Steamboat Point, and the construction of Long Bridge in 1869 improved access to the area.


Sonoma County
Napa County
Solano County
Marin County
Contra Costa County
San Francisco County
Alameda County
San Mateo County
Santa Clara County
San Francisco Bay
0 MILES 20

● MISSION BAY PROJECT AREA LOCATION

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE III.1
LOCATION OF PROJECT AREA IN BAY AREA REGION

In the late 1860's, the California Legislature granted the Southern Pacific and Western Pacific railroads 30 acres each of Mission Bay tidelands to develop a railroad terminal. Southern Pacific eventually acquired rights-of-way to Mission Bay, more tidelands, and water rights until it owned a majority of Mission Bay. The City also designated the northern shoreline of Mission Bay as its only official dump; hence, the landfill became known as "Dumpville." Other fill occurred after the 1860's, and, by the turn of the century, only the central portion of the Project Area was still open water. Lumber, shipyards, furniture, canning, glass-making, warehousing, and rail uses were the principal activities in that period. After the 1906 earthquake and fire, Southern Pacific Railroad used debris to complete filling in all of its holdings in Mission Bay. Eventually, all that remained of Mission Bay was the narrow inlet of China Basin Channel.

The Atchison, Topeka and Santa Fe Railway (Santa Fe) began to serve San Francisco via car ferry from Richmond around the turn of the century. Santa Fe's San Francisco facilities were developed on about 24 acres of new fill east of Illinois Street. Thus, the Project Area has been used predominately for transportation and industrial uses. A full discussion of the history of the Project Area is included in VI.J. Cultural Resources, p. VI.J.1.

PREVIOUS DEVELOPMENT PROPOSALS FOR MISSION BAY

In July 1981, Southern Pacific presented a preliminary development program to the City for 6,000 residential units, 1,600 hotel rooms, 5 million square feet of office space, 2.5 million square feet of commercial use, warehouse, secondary office, and showroom space, 400,000 square feet of retail space, and 310,000 square feet of recreational space. The project was to be known as Mission Bay, after the bay that formerly existed on the site. That plan elicited substantial debate. In April 1983, Southern Pacific submitted a revised proposal that included 7,000 housing units, 11.7 million square feet of office space, 4.3 million square feet of research and development space, 500,000 square feet of retail and hotel space (with building heights up to 42 stories), and 40 acres of parks, waterways and plazas. Those two proposals were identified by the Department of City Planning as inconsistent with the City's Master Plan Elements, which called for housing, local employment and maritime use in the Project Area.

The parent companies of Southern Pacific and Santa Fe merged in December 1983 to form the Santa Fe Southern Pacific Corporation. Its real estate subsidiary, Santa Fe Pacific

Realty Corporation (SFP), now manages all Santa Fe Southern Pacific land in Mission Bay. In August 1984, Mayor Dianne Feinstein announced a tentative understanding with Santa Fe Pacific on land use guidelines for Mission Bay. In a letter dated October 16, 1984 (hereinafter referred to as the Mayor's Letter), Mayor Feinstein stated what she would support for development of Mission Bay, and Santa Fe Pacific Realty Corporation acknowledged its agreement with the guidelines. Those guidelines included: no buildings over eight stories, at least 7,577 residential units, of which at least 30% would be affordable; up to 2.6 million square feet of research and development space; up to 4.1 million square feet of office space; up to 200,000 square feet of retail space; parks, lagoons, canals, waterways, and public open spaces; no impairment of rail access for businesses and port use; relocation of the CalTrain commute station to Seventh and Channel Streets, while retaining a right-of-way to downtown; MUNI Metro extension to 16th Street; and a 19-acre park on port property. In May 1986, a second letter from Mayor Feinstein added a ballpark at Seventh and Townsend Streets, a 500-room hotel, and 124 additional housing units to the guidelines for Mission Bay development.

THE MISSION BAY PLAN - PROPOSAL FOR CITIZEN REVIEW

In May 1985, the San Francisco Department of City Planning began preparing an "implementable development plan for a mixed-use Mission Bay community." The Department and its consultants began working with community representatives, other government agencies, and Santa Fe Pacific to develop objectives and policies and a preferred plan for Mission Bay.

The joint planning effort included 23 background reports and special studies by the Department of City Planning and its consultant team, documenting technical issues, objectives and policies, and economic, land use, transportation, and design concerns guiding Mission Bay development. The Mission Bay Plan, Proposal for Citizen Review, published in January 1987, provides a land use program and a plan, social and economic programs, design guidelines, and land use controls that, following public review and environmental analysis, can be incorporated as revised into the Master Plan and City Planning Code./2/ The Mission Bay Plan area encompasses 294 to 309 acres, depending on whether port land east of Third Street near Piers 50 to 54 is included.

The area east of Third Street considered in The Mission Bay Plan, Proposal for Citizen Review differs from that studied in this Environmental Impact Report (EIR). The Mission Bay Plan proposal focuses on Santa Fe Pacific land and port land that was included in the Mayor's Letter. To produce a more integrated site plan, it also included a parcel of port-controlled land generally south of Mission Rock Street and east of the extended Fourth Street alignment./3/ The Mission Bay Plan proposal did not include land west of Illinois Street and south of the Eldorado Street alignment, though the EIR Project Area does./4/

ENVIRONMENTAL DOCUMENTATION

OBJECTIVES OF THIS EIR

Santa Fe Pacific Realty Corporation, the project sponsor, submitted an application for Environmental Evaluation (EE) on September 22, 1986 (86.505E). The EE application is a formal request by the applicant for environmental review, and notice was published on August 28, 1987, stating a full environmental impact report for Mission Bay would be prepared. Under the California Environmental Quality Act (CEQA), the Department of City Planning, as lead agency for the City and County of San Francisco, must prepare an EIR when a proposed project could have significant adverse impacts on the environment. This document constitutes the Environmental Impact Report (EIR) for the Mission Bay project.

The principal purpose of the EIR is to provide the City Planning Commission, other public decision-makers, and the public with a clear and objective assessment of the environmental consequences of the proposed Alternatives and to identify mitigation measures to eliminate or minimize adverse impacts. The EIR also serves as a decision-making tool for policy makers with jurisdiction over various aspects of the project.

DRAFT AND FINAL EIR

The Draft Environmental Impact Report for the Mission Bay project consists of Volume I, Volume II, and the companion appendix volume. The Final EIR for Mission Bay will consist of the Draft EIR and the Summary of Comments and Responses document that will contain public comments received on the Draft EIR; a list of persons, organizations and agencies commenting on the Draft EIR; responses to significant environmental points raised in the comments; and other information that may be added by the City.

DESCRIPTION OF MISSION BAY PROJECT AREA

The Project Area is relatively level, and the water table is between 3.5 to 9 feet below the ground surface. Under 3 to 27 feet of land fill is bay mud ranging from 40 to 130 feet. No natural vegetation remains, although the edges of the China Basin Channel show some marsh and marine vegetation. Along the south side of the channel is the only improved open space area in the Project Area.

Primarily zoned as an M-2 (Heavy Industrial) Use District, the Mission Bay Project Area historically has supported rail yard and warehousing activities. The Project Area has not been developed fully, with only part of the street grid improved and many rights-of-way in disrepair. Excluding streets and channel, close to two-thirds of the land is underused or open (e.g., rail yards, unattended parking lots, or vacant). Although about 70 acres nominally are devoted to rail use, the tracks of the former Southern Pacific railyard in the center of the Project Area were removed in 1987. About one-third of the land is used by businesses, primarily as truck terminals and warehouse facilities in one- or two-story industrial buildings.

SUBAREAS

For descriptive purposes, the Mission Bay Project Area is divided into three subareas (see Figure III.2). Third Street, running north-south, and China Basin Channel, running northeast-southwest, are the dividing lines. The subarea north of the channel is referred to as "north of channel". The subarea west of Third Street and south of the channel is referred to as "west of Third Street", while the subarea east of Third Street is referred to as "east of Third Street".

The north of channel area covers about 60 acres. About one-fourth of the land is in active use by businesses. The I-280 freeway connection and elevated freeway stub occupy about 14 acres, and rail lines and the CalTrain commute station occupy about 22 acres. The Channel Street (sewage) Pump Station is at the southwestern end of the channel near Seventh Street. The remaining land is vacant or used for parking. Within the Project Area, China Basin Channel covers about 12 acres west of Fourth Street. The channel varies in width from 180 to 280 feet and in depth from 27 to 0 feet over its 5,300-foot length, ending at the Channel Street Pump Station. The channel is crossed by steel truss drawbridges at Third and Fourth Streets.

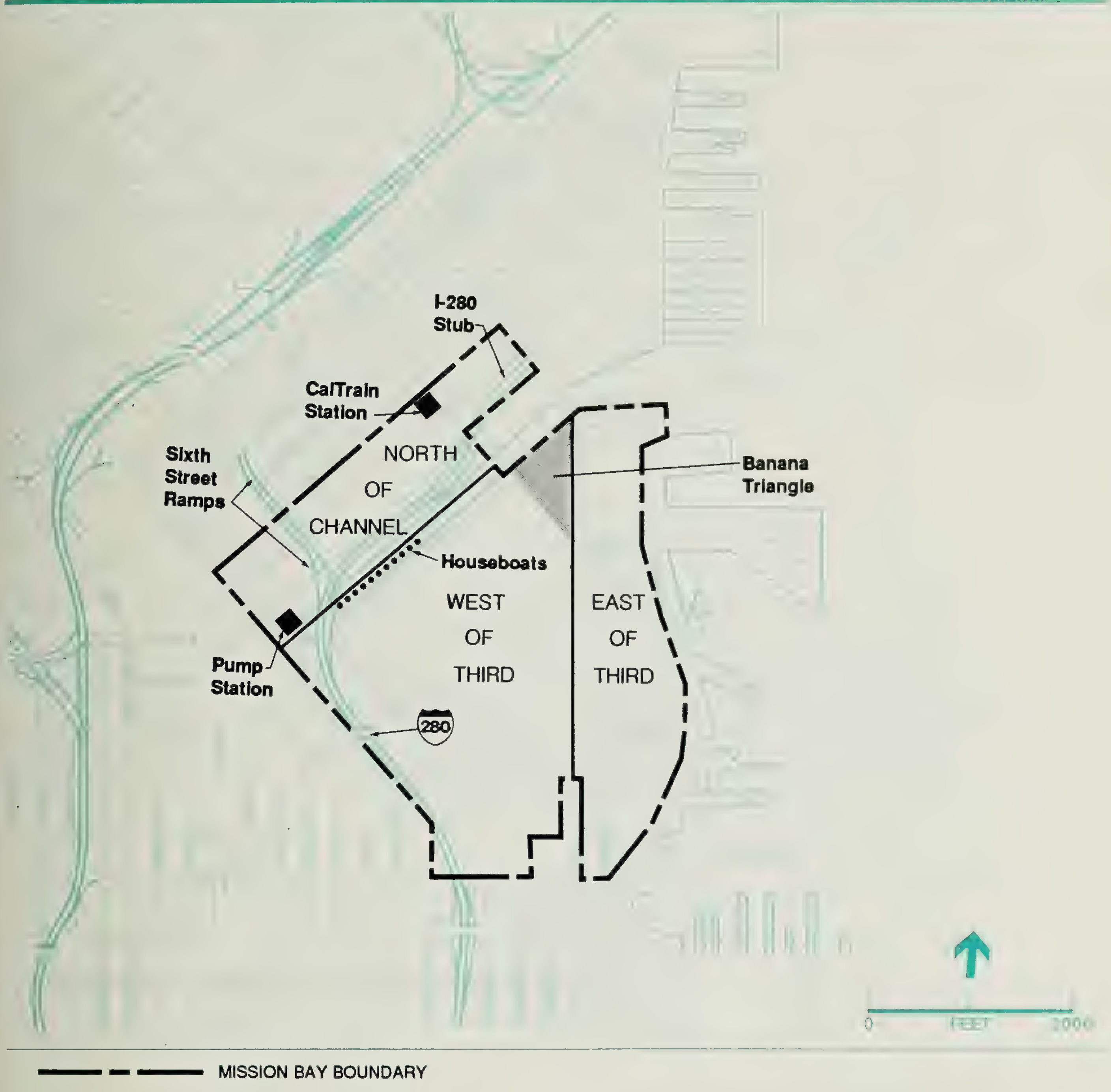

I-280
Stub
CalTrain
Station
Sixth
Street
Ramps
NORTH
OF
CHANNEL
Houseboats
Banana
Triangle
WEST
OF
THIRD
EAST
OF
THIRD
Pump
Station
280
0
FEET
2000
MISSION BAY BOUNDARY

FIGURE III.2
SUBAREAS OF MISSION BAY

SOURCE: Environmental Science Associates, Inc.

The area west of Third Street covers about 170 acres. One-third of the land is in business use, mostly truck terminals. The remaining land is rail yards, unattended parking, or vacant land, giving a generally open appearance. The area bounded by the channel, Third and Fourth Streets is commonly referred to as the Banana Triangle, a destination for banana shipments in the 1930s. Twenty houseboats and 35 recreational boats are berthed on the southern edge of the China Basin Channel.

The area east of Third Street covers about 80 acres. About 55% of the area is in business use and only 16% is vacant. Over half the Project Area maritime businesses are east of Third Street; major businesses include a large apparel outlet and two ready-mix concrete plants.

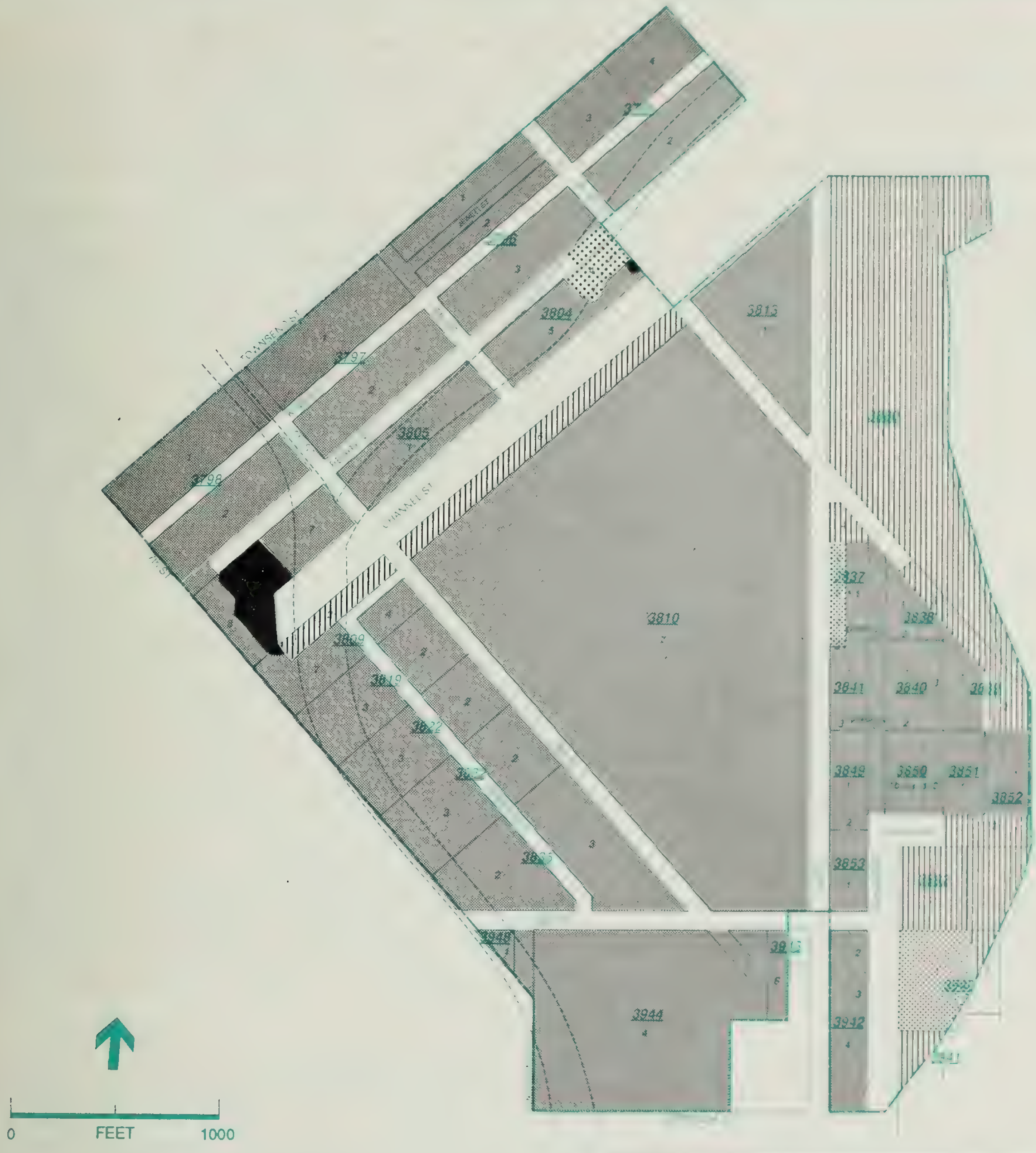
LAND OWNERSHIP

The two major landowners are Santa Fe Pacific Realty Corporation and the City and County/Port of San Francisco (see Figure III.3). Land ownership or control is approximately as follows: Santa Fe Pacific Realty Corporation/5/ - 215 acres; City and County of San Francisco - 2 acres; Port of San Francisco - 40 acres; other private parties - 5 acres; Caltrans - 1 acre; rights-of-way for developed streets - 50 acres. Approximately 12 acres are occupied by China Basin Channel.

Excluding Santa Fe Pacific, all private land is east of Third Street. The land under the jurisdiction of the Port of San Francisco is within the authority of the State Lands Commission and held in trust by the Port for the people of the State of California. The acre owned by Caltrans is located at the southwestern corner of the intersection of Berry and Fourth Streets.

AREAS SURROUNDING MISSION BAY

North and northeast of the Project Area is the South of Market, often considered an extension of downtown, but an area with a growing identity of its own. West of Fourth Street a small service, sales, and light-industrial base continues. East of Fourth Street is changing to office, office services, housing, and mixed retail. Non-residential use co-exists with a predominately lower income, rental residential community. To the west is Showplace Square, a center of design and showroom activity. To the southwest is North Potrero, an older industrial area evolving into an industrial/warehousing district adjoining the Project Area along Seventh Street. That area is dominated by manufacturing and


3804
3797
3805
3798
CHANNEL ST
3813
3810
3809
3819
3822
3837
3838
3841
3840
3849
3850
3851
3852
3853
3944
3942
3941
0
FEET
1000

—·— MISSION BAY BOUNDARY

3941 ASSESSOR'S BLOCK NUMBER

1 ASSESSOR'S PARCEL NUMBER

▩ SANTA FE PACIFIC REALTY CORPORATION

▒ OTHER PRIVATE PROPERTY

░ STATE OF CALIFORNIA

▥ PORT / PUBLIC TRUST

■ CITY AND COUNTY OF SAN FRANCISCO

NOTE: Existing streets are shown. Undeveloped platted streets and rights-of-way are not differentiated from surrounding properties.

Mission Bay

SOURCE: Environmental Science Associates, Inc.
and S.F. Department of City Planning

FIGURE III.3
MISSION BAY PROJECT AREA
LAND OWNERSHIP

transportation-related businesses. South of Mariposa Street to the southwest is Potrero Hill, primarily a residential area with a high degree of homeownership. The residential sector is separated from the Project Area by I-280 and a strip of industrial uses that extends into North Potrero. East of I-280 and south of the Project Area is Lower Potrero, with an industrial area adjacent to the Project Area and a residential community several blocks farther south. To the south and east is the Central Bayfront, containing maritime and industrial businesses, including the site of the former Todd Shipyards at Pier 68 and an automobile import terminal at Pier 70. The Central Bayfront also includes Piers 48 to 64, associated seawall lots, a public boat ramp south of Pier 50, and Agua Vista Park, which border the east side of the Project Area. Operations at these adjacent piers include ship repair and off-loading and storage of bulk paper. In addition, several restaurants are located along the waterfront.

NOTES - Background and Area Description

/1/ The Project Area boundary is as follows: starting at the corner of Townsend and Third Streets, proceed southwest along Townsend to Seventh Street, southeast along Seventh to Pennsylvania Street, south along Pennsylvania to Mariposa Street, east on Mariposa approximately 940 feet, north about 433 feet, east approximately 280 feet, north to 16th Street (excluding the building at the northeast corner of Third and Mariposa), east along 16th to Third Street, south on Third to Mariposa Street, east on Mariposa to China Basin Street, north on China Basin to the north boundary of Pier 48, north, following the waterside boundary of Pier 62 to Third Street, southwest along Channel Street to Fourth Street, northwest along Fourth to Berry Street, northeast along Berry to Third Street, and finally northwest to Townsend Street. The Project Area includes approximately 12 acres of China Basin Channel west of Fourth Street and excludes the China Basin Building between Third and Fourth Streets north of the channel and parcels on the west side of Third Street between 16th and Mariposa Streets.

/2/ The land use program in the Mission Bay Plan proposal would include about 7,700 to 7,960 dwelling units; 2.6 to 4.1 million square feet of offices; 2.3 to 2.6 million square feet of S/LI/RD space; 300,000 square feet of retail; 200,000 square feet of community uses; 500 hotel rooms; a ballpark; up to 78 acres of open space and about 70 acres of streets and other infrastructure. San Francisco Department of City Planning, The Mission Bay Plan, Proposal for Citizen Review, San Francisco, January 1987.

/3/ The Mission Bay Plan, Proposal for Citizen Review, pp. 5-12.

/4/ A possible land exchange between the Port of San Francisco and Santa Fe Pacific Realty Corporation is discussed in V. The EIR Alternatives and Approval Process, p. V.42.

/5/ Santa Fe Pacific Realty Corporation controls land whose title is held by Santa Fe Land Improvement Company, Southern Pacific Land Company, and Southern Pacific Development Corporation.

IV. STUDY APPROACH AND ORGANIZATION

The Mission Bay EIR is a program EIR, as defined in CEQA Guidelines Section 15168, providing a comprehensive evaluation of impacts associated with development in Mission Bay, within the context of future growth in San Francisco and the Bay Area region. The analyses contained herein will allow decision-makers to make informed decisions on a development program for the Mission Bay Project Area, and may also be incorporated in subsequent environmental evaluations that may be required for development phases that implement the development program. This program EIR will thus provide an overall context in which to consider decisions made for future, more detailed levels of project implementation, as well as providing a broad area-wide analysis for planning purposes. The cumulative impact analysis contained in the Mission Bay will also establish a complete, updated information base that may be referenced or incorporated in environmental evaluations for other projects.

This chapter summarizes important technical and organizational features of the Mission Bay EIR. The purpose of the Study Approach discussion is to explain the structure of the impact assessment and basic conventions of the EIR analysis. The first section introduces the three development Alternatives for the Mission Bay Project Area, and variations on those Alternatives (Chapter V. The EIR Alternatives and Approval Process, describes the Alternatives in detail; the variations are analyzed in Chapter VII. Variations on the Alternatives). The second and third sections define local and cumulative impact perspectives and introduce the geographic areas associated with each. The difference in those perspectives is an important aspect of the EIR. The fourth section then sets out the analysis years for Setting and Impact assessments. The fifth section introduces the scenarios for future activity in the Downtown & Vicinity, the City, and the rest of the region that form the background context for analysis of local impacts and also serve as parameters for growth, analyzed in the EIR cumulative impact assessment. The sixth section relates the Mission Bay EIR to the Downtown Plan EIR. The layout of the EIR is described in the final discussion, Organization of the Report.

STUDY APPROACH

ALTERNATIVES

The Mission Bay EIR describes impacts of Alternatives for development of the Mission Bay Project Area. The EIR focuses on three Alternatives (Alternatives A, B, and N - the No Project Alternative) at a program level of analysis. The Alternatives are assessed at equal levels of detail.

Alternative A is a master-planned, mixed-use development. Of the Alternatives reviewed in this EIR, it is the most similar to the land use program in the Environmental Evaluation application (86.505E) submitted by the project sponsor. It is also the most similar to the program in the Mayor's Letter and Mission Bay Plan, Proposal for Citizen Review (see Chapter III. Background and Area Description, p. III.4), but includes additional Service / Light Industrial / Research and Development (S/LI/RD) uses in the area not covered by the Mayor's Letter. Alternative B is a master-planned development containing more housing and open space and less commercial space than Alternative A. It has three wetlands areas. Alternative N, the No Project Alternative, represents one likely development scenario that could be expected to occur without any coordinated planning effort under existing M-2 (Heavy Industrial) zoning.

The Mission Bay Plan, Proposal for Citizen Review, although similar to EIR Alternative A, is not directly analyzed in the EIR. The "Plan" for Mission Bay is recognized to be an evolving program, one that will continue to be refined in response to public review and comment, and ongoing negotiations between the City and project sponsor even after the Final EIR is completed. As a result, the objective of the EIR is to select alternatives that among them cover the range of land use program elements and issues contemplated in this on-going planning effort for Mission Bay.

The Alternative land use programs for Mission Bay are defined in general terms: types and amounts of building space and housing units, amount and characteristics of open space, major infrastructure requirements, and transportation features. To analyze some types of impacts, the land use programs have been translated to estimates of Project Area employment and population. Those estimates should not be considered the only possible outcomes, but rather, reasonable scenarios of what is likely to occur under each Alternative. (Chapter V. describes the land use programs and employment and population estimates associated with each Alternative.)

Chapter VII. Variations on Alternatives, analyzes ten variants on the EIR Alternatives. The variants include: housing under no-project conditions; retention of port-priority uses east of Third Street; reduced overall housing densities; increased retail, commercial, and community facilities; office space on some port land; and higher heights for some housing north of the channel. Also discussed are the implications of permitting office uses in S/LI/RD space; varying the percentage and size of units in affordable housing; retaining the CalTrain station near its present location; and reduced seismic hazard.

PERSPECTIVES FOR IMPACT ASSESSMENT

There are two perspectives for the EIR analysis of the Mission Bay Alternatives: the local perspective and the cumulative perspective. The local perspective analyzes growth and physical changes represented by the Alternatives, as well as the timing of impacts. Local impacts are identified within the Project Area and in the vicinity of the Project Area, i.e., in adjacent commercial/industrial areas or nearby residential neighborhoods. The cumulative perspective, on the other hand, looks at the Mission Bay Alternatives in conjunction with other future development and change, to assess the combined effects of that larger amount of future activity. For this EIR, an area referred to as the Downtown & Vicinity receives special attention in the cumulative analyses. (The Downtown & Vicinity is defined in the next subsection.) The focus on Downtown & Vicinity updates and expands on earlier EIRs and specifically places Mission Bay in the context of downtown growth - a planning issue of concern to many San Franciscans. Growth in the rest of the City and the region also is analyzed as part of the future scenarios for cumulative impact assessment.

Impacts assessed from the cumulative perspective are those on citywide and regional conditions with respect to housing markets, transportation systems, energy resources, and air quality, for example. The rationale behind the cumulative perspective is that infrastructure, transportation facilities, housing supply, and other systems that would serve Mission Bay also would be expected to serve a larger total number of residents and employees in the future, due to continued economic growth and development, of which Mission Bay would be only one part. In sections covering public plans, policies and permits and community services and infrastructure, the perspectives of the analyses vary from local and citywide to regional, as appropriate. Those sections were prepared in close consultation with agencies and districts responsible for serving the Project Area or whose plans and policies would be affected by development of Mission Bay.

GEOGRAPHIC AREAS

The perspective of the impact assessment varies depending on what is relevant in each EIR subject area. Consequently, the EIR sections discuss a variety of geographic areas and subareas in the course of discussing the local and cumulative perspectives.

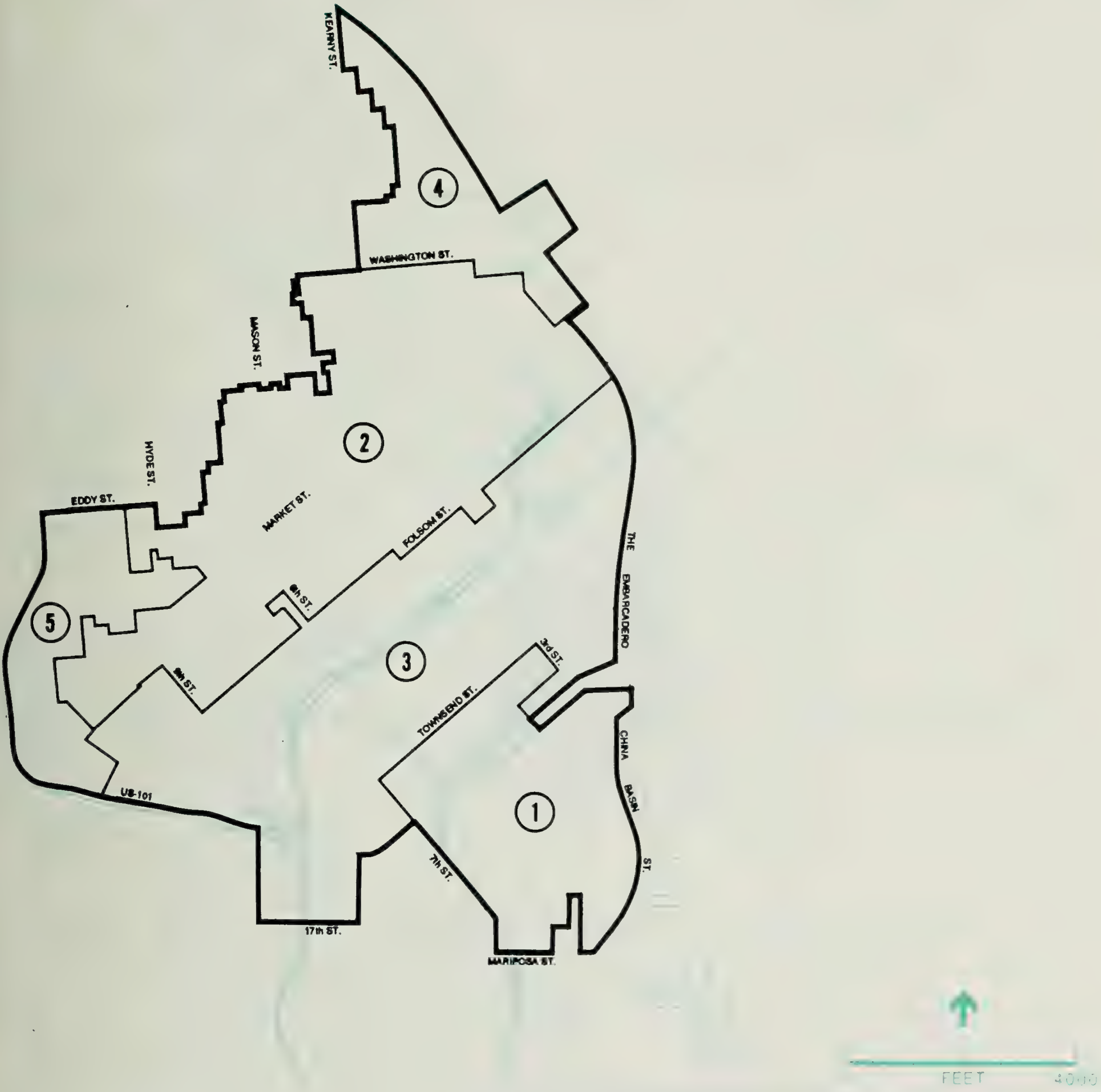
Downtown & Vicinity

Figure IV.1 shows the boundaries of the area defined in the EIR as Downtown & Vicinity. The Mission Bay Project Area is part of that area. Figure IV.1 also shows the boundaries of the other subareas: C-3 District, South of Market, Northeast Waterfront, and Civic Center / South Van Ness. The C-3 District subarea incorporates the Financial District, Union Square, Yerba Buena Center, the Special Development District around the Transbay Terminal, as well as the mid-Market Street area, parts of the North-of-Market Mixed-Use District, and part of Chinatown./1/ The South of Market subarea extends from just north of Folsom Street to Townsend Street (covering most of the area addressed in the proposed South of Market Plan, as well as Rincon Hill and South Beach areas) and includes most of Showplace Square. The Northeast Waterfront consists of commercially zoned areas north of Washington Street, wrapping around the eastern side of Telegraph Hill. Jackson Square, Golden Gateway, the Ferry Building, part of the Broadway commercial strip as well as blocks up through and including Levi Plaza are in the Northeast Waterfront. The Civic Center / South Van Ness subarea includes government and cultural facilities and parts of the Hayes - Gough neighborhood commercial area north of Market Street as well as an area zoned C-M (Heavy Commercial) south of Market Street bounded on the west by the Central Skyway.

Nearby Areas

Figure IV.2, p. IV.6, shows the Project Area and Nearby Areas that are the focus of analysis of localized impacts. In some cases, growth in one or more Nearby Areas provides a background context for the EIR analysis. The Nearby Areas are defined according to established planning area boundaries. Three of them are also in the Downtown & Vicinity. The Nearby Areas of interest in this EIR are:

- South of Market;
- Showplace Square;
- Other Parts of Downtown & Vicinity;
- North Potrero;
- Potrero Hill;



KEARNY ST.
4
WASHINGTON ST.
MASON ST.
2
HYDE ST.
EDDY ST.
MARKET ST.
FOLSOM ST.
THE EMBARCADERO
5
6th ST.
9th ST.
3
3rd ST.
TOWNSEND ST.
CHINA BASIN ST.
US-101
1
7th ST.
17th ST.
MARIPOSA ST.
FEET
4000

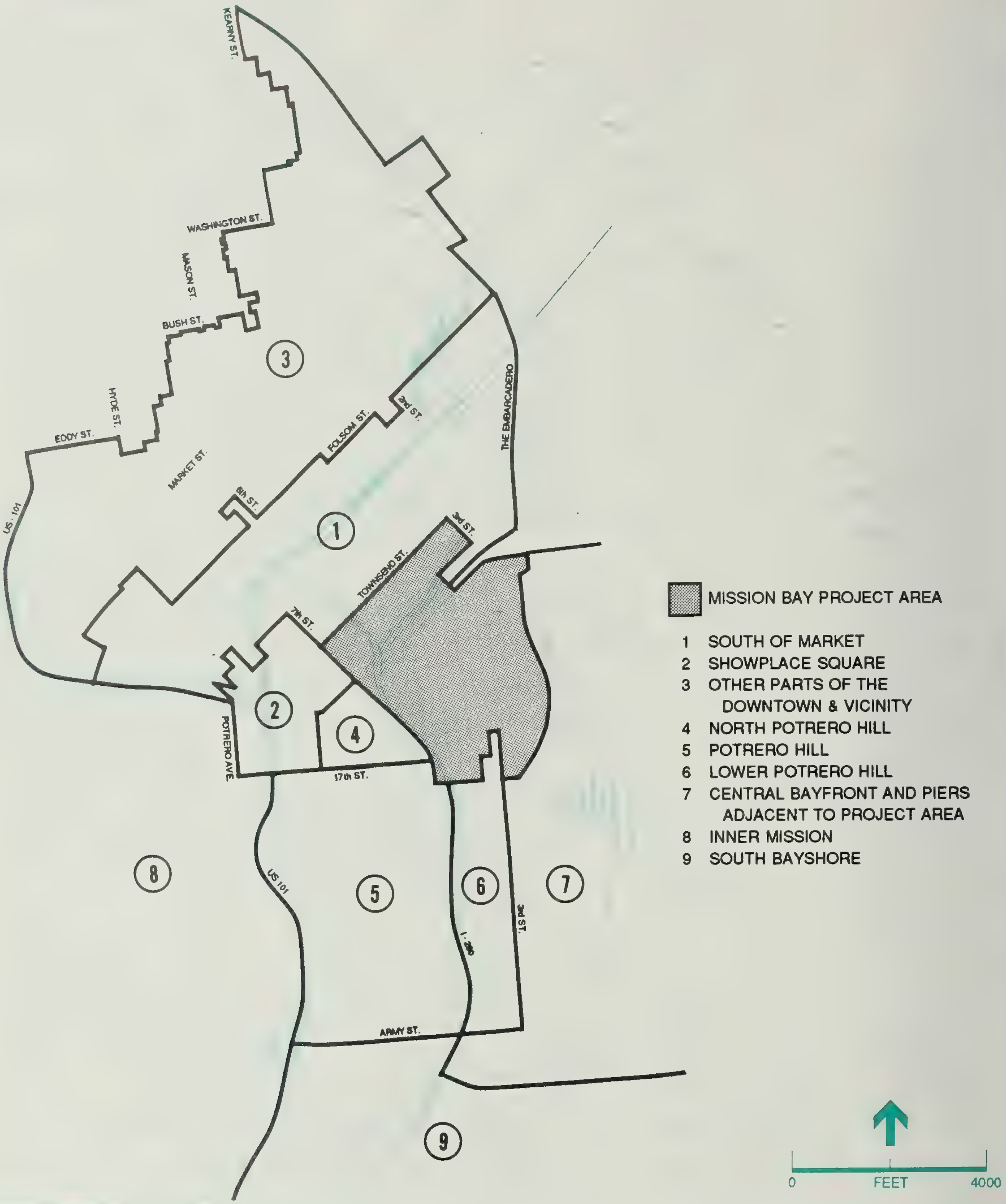
━ DOWNTOWN & VICINITY CUMULATIVE AREA

─ SUBAREAS:

① MISSION BAY PROJECT AREA
② C-3 DISTRICT
③ SOUTH OF MARKET
④ NORTHEAST WATERFRONT
⑤ CIVIC CENTER / SOUTH VAN NESS

SOURCE: Environmental Science Associates, Inc.
and Recht Hausrath & Associates

FIGURE IV.1
SUBAREAS OF DOWNTOWN & VICINITY


KEARNY ST.
WASHINGTON ST.
MASON ST.
BUSH ST.
HYDE ST.
EDDY ST.
US 101
MARKET ST.
FOLSOM ST.
2nd ST.
THE EMBARCADERO
6th ST.
3rd ST.
TOWNSEND ST.
7th ST.
POTRERO AVE.
17th ST.
US 101
I - 280
3rd ST.
ARMY ST.
1
2
3
4
5
6
7
8
9
▨ MISSION BAY PROJECT AREA
1 SOUTH OF MARKET
2 SHOWPLACE SQUARE
3 OTHER PARTS OF THE DOWNTOWN & VICINITY
4 NORTH POTRERO HILL
5 POTRERO HILL
6 LOWER POTRERO HILL
7 CENTRAL BAYFRONT AND PIERS ADJACENT TO PROJECT AREA
8 INNER MISSION
9 SOUTH BAYSHORE
0
FEET
4000

Mission Bay

FIGURE IV.2
NEARBY AREAS

SOURCE: Environmental Science Associates, Inc.

- Lower Potrero;
- Central Bayfront and piers and associated seawall lots east of the Project Area;
- Inner Mission; and
- South Bayshore.

The last two Nearby Areas are more distant from the Project Area and less affected by the Alternatives, and so are treated at a lesser level of detail than those that are closer.

ANALYSIS YEARS

Setting

The EIR describes existing conditions for the Project Area, as well as for Nearby Areas and the cumulative context, where appropriate. The Setting year for the Mission Bay EIR is 1985. Project Area data collection for most sections of the EIR was completed in 1985 and 1986. Among annual data sources used for the EIR, 1985 and fiscal year 1985-86 reports were the most recent available at the time most analysis was done. Where no data for 1985 were available, the best recent available data were used. The year 1985 represents the mid-decade and is a benchmark year used in other planning efforts. Where Setting conditions have changed substantially since 1985, the EIR presents updated information. To assist the reader's orientation in the Project Area, the base maps for the EIR have been updated to show the removal of the former Southern Pacific rail yards in the center of Mission Bay, and completion of the South Beach Marina.

Future Context

Development of Mission Bay would be a long-term project. The amount of building space represented by the Alternatives (whether commercial or residential space) would be built and occupied in phases over a long time. The approach in the EIR is to consider development and occupancy of Mission Bay in the context of the commercial real estate and housing markets of which it would be a part, thus providing a basis for determining the appropriate time frame for build-out of Mission Bay. An estimate of the build-out time frame (or number of years to full occupancy) thus enables the Alternatives for the Project Area to be analyzed within a cumulative context of other future development activity in downtown San Francisco, the rest of the City, and the Bay Area region. The build-out time frame sets the parameters for forecasting the future context in addition to Mission Bay that is the subject of the cumulative analysis in the EIR.

The Mission Bay EIR uses economic forecasts to define the future cumulative context for growth in addition to Mission Bay. The forecasts (or scenarios) are estimates of expected future employment, development activity, households, and population. They are based on analysis of economic and demographic trends and relationships, and on projections of expected patterns of growth and change.

There are two analysis years for impact assessment. Analysis of commercial and residential development in Mission Bay in the context of growth trends and potentials in the Downtown & Vicinity, the rest of the City, and the region indicates that build-out and full occupancy of the Mission Bay Alternatives would take about 30 years after the first buildings are occupied. Assuming occupancy starts around 1990, the 30-year build-out period would extend through 2020. Therefore, the build-out analysis year is approximately 2020. The year 2000 was selected as an interim analysis year, representing a commonly used planning horizon. The year 2000 is used as a future benchmark for other city and regional forecasts (such as projections prepared by the Associations of Bay Area Governments), and other planning effort and EIRs (such as planning and analysis for the Downtown Plan, Downtown Plan EIR, and rezoning South of Market).

It is important to understand that the years 2000 and 2020 are not in and of themselves important. In cumulative analysis and impact assessment, it is not necessary or possible to identify the precise year when effects of cumulative growth would first be in evidence. Consequently, the dates 2000 and 2020 are not intended as precise indicators of when certain events would occur. They are benchmark years that define an approximate time span during which Mission Bay development and other growth would occur and during which there would be impacts of that growth.

Topics for which conditions in the interim year 2000 are analyzed include: VI.B. Land Use, Business Activity, and Employment; VI.C. Housing and Population; VI.D. Community Services and Infrastructure; VI.E. Transportation; and VI.F. Air Quality. For the topics where the environmental analysis focused on the physical effects of development within the Project Area, the analysis is presented for the Alternatives at build-out. That permits overall review of the full effects of development.

Comments on Future Analysis Years

There are important distinctions between the nature of conclusions related to comparison of the Alternatives at build-out and the nature of conclusions about the cumulative context 35 years into the future (1986-2020). With the exception of issues related to phasing of development, impact assessment of the Alternatives at build-out reveals the fullest extent of differences among choices for development of Mission Bay. In many aspects of Project Area and local area impact assessment, conclusions about differences among the Alternatives at build-out depend primarily on how each Alternative is defined (i.e., on the land use programs, the amount and location of development of various types, transportation features, and so forth). In those aspects, impact assessment is relatively independent of a quantified long-term future context. However, because the Alternatives are not fully developed by the interim analysis year, impact assessment of the Alternatives in 2000 does not represent in full the implications of choosing among them.

The forecasts of the cumulative scenarios for other growth besides Mission Bay through 2020 and the systems to serve that growth are more speculative than the forecasts of the cumulative scenarios in 2000. Forecasts over 30 years into the future are, by definition, more uncertain. The longer the forecast period, the more likely it is that technological changes or other factors that could influence the course of the economy, population growth, or behavior and preferences might change the basic presumptions (based on current experience and trends) behind the longer-term scenarios.

Nevertheless, meaningful conclusions can be drawn from the longer-term cumulative analysis in this EIR. In particular, comparison of the Alternatives at build-out against a background cumulative context for 2020 is valid. Although the background context is described only in general terms and is understood to be speculative, the difference among impacts of the Alternatives in that context can be described with a fair degree of certainty. Moreover, even if the background scenarios were to be significantly different from those presumed in the EIR, the conclusions about the differences among the Alternatives (the primary subject of the EIR) against the background of that different cumulative context might remain the same.

Other aspects of cumulative analysis rely more directly on forecast of cumulative growth and assumptions about systems to serve that growth, such as those systems related to mitigation of transportation impacts in which development of Mission Bay cannot be considered independent of the context of other growth and change. Because of uncertainties about service systems that might be available in the 2020 scenarios, most of the attention and detailed quantitative analysis are focused on the year 2000 analysis in those parts of cumulative impact assessment. The impact assessment for 2020 is therefore more general and conceptual.

GROWTH SCENARIOS FOR IMPACT ASSESSMENT

The next chapter of the EIR (V. The EIR Alternatives and Approval Process) presents detailed tables for the Project Area showing building space, land area, employment, housing, and population associated with each of the Mission Bay Alternatives at build-out. The chapter also includes tables and discussion presenting estimates of the status of Project Area development in 2000 under each of the Alternatives. It specifies the areas where construction would first be undertaken - the initial phase of development. The description of existing conditions in terms of space, employment, housing, and population in the Project Area is presented in the first part of VI.B. Land Use, Business Activity, and Employment, starting on p. VI.B.1, and in VI.C. Housing and Population, starting on p. VI.C.1.

The cumulative downtown, citywide, and regional context analyzed in this EIR is presented in the Future Context sections of VI.B. Land Use, Business Activity, and Employment, p. VI.B.50, and VI.C. Housing and Population, VI.C.36. Each of those sections presents existing conditions for the relevant subject (land use and employment, or housing, population, and demographics) for Downtown & Vicinity, the total City, and the Bay Area region. Following description of existing conditions, there is a subsection entitled "Future Context." These subsections present the 2000 and build-out/2020 growth scenarios used in the cumulative analysis. The future context subsections include tables and text describing forecasts of employment and population for Downtown & Vicinity, the total City, and the Bay Area region.

The scenarios for future cumulative growth presented under the heading "Future Context" were developed specifically for the Mission Bay EIR. The scenarios are sensitive to and reflect differences among the Mission Bay Alternatives as they would affect the future cumulative context. In analysis of the Alternatives and of their effect on future development patterns and amounts of growth, the focus was on Downtown & Vicinity and the rest of San Francisco. Those are the levels at which differences in the cumulative scenarios among the Alternatives are apparent. While basic area data, information on economic and demographic trends, and relevant forecasts were consulted when available from other sources, the scenarios for Downtown & Vicinity and the total City presented in the EIR are products of a detailed forecasting analysis undertaken for review of the Mission Bay Alternatives. The regional scenarios, on the other hand, are less sensitive to differences in the Mission Bay Alternatives. Consequently, the future scenarios for the rest of the region (outside San Francisco) rely more directly on forecasts prepared by the

Association of Bay Area Governments (ABAG), state Department of Finance (DOF), and the Metropolitan Transportation Commission (MTC).

Proposition M, passed by San Francisco voters in November 1986, is incorporated in the cumulative scenarios of development and economic growth analyzed in the EIR. Proposition M limitations on the amount of office space that can be approved in the City are factored into the forecasts for office space and employment in other parts of Downtown & Vicinity and the rest of the City. However, with respect to the Mission Bay Alternatives, it is assumed that Proposition M's annual limit on citywide office development approvals would not constrain the amount or pace of development in the Project Area; this could be achieved, as it was for Executive Park, by the voters exempting Mission Bay from the Proposition M annual limit as allowed for in the law (San Francisco City Planning Code, Section 321.3). The discussions in VI.B. Land Use, Business Activity and Employment, p. VI.B.63, and Appendix B, p. XIV.B.37, describe how Proposition M is considered. In brief, the approach was to be conservative for purposes of environmental impact analysis by assuming Proposition M limits, with some additional exemptions besides Mission Bay. The effect is to incorporate somewhat more development than allowed under a strict Proposition M forecast and thus not to limit with an external constraint the amount of cumulative growth analyzed within the time frame of the EIR analysis.

The 2000 and build-out/2020 scenarios of employment and population, presented in the "Future Context" discussions in VI.B. and VI.C. are carried throughout the Mission Bay EIR analyses where issues of cumulative growth are considered. EIR sections where cumulative growth is relevant use the same basic future context for impact assessment. For example, the forecasts are the basis for discussion of Mission Bay's effects on Downtown & Vicinity, the rest of the City, and the rest of the region. The employment forecasts are combined with the housing and population analysis, to produce forecasts of places of residence and places of work used in the transportation analysis as part of the forecasts of future travel patterns. The transportation projections, in turn, generate information for analyzing air quality, noise, and energy impacts. The areas of geology and seismicity, hazardous materials, hydrology and water quality, vegetation and wildlife, cultural and historic resources, and architectural resources and urban design focus more specifically on activities in and adjacent to the Project Area.

RELATIONSHIP TO DOWNTOWN PLAN EIR

The City prepared and certified an EIR on the Downtown Plan and alternatives to that Plan in 1982-1984. The Downtown Plan proposed growth controls for the C-3 Downtown Commercial District. The Downtown Plan EIR included a comprehensive forecast of employment and space growth likely to occur through the year 2000 under the Plan and each of the alternatives. The employment growth was used to analyze cumulative impacts of downtown growth, such as those on transportation and air quality, in the context of the rest of San Francisco and the region.

The cumulative analysis in the Mission Bay EIR is an extension of the approach and methodology used in the Downtown Plan EIR. In that respect, the Mission Bay EIR updates and builds upon analysis in the earlier effort. The area for which the most detailed analysis is done (referred to in this EIR as the Downtown & Vicinity) has been expanded to include the Mission Bay Project Area, and South of Market, Northeast Waterfront, and Civic Center / South Van Ness areas in addition to the C-3 District analyzed in the Downtown Plan EIR. The Setting has been updated to reflect conditions in 1985. The Downtown Plan EIR forecasts have been reviewed in light of current conditions and revised as needed to reflect current thinking about economic activity in the City and the downtown area. Finally, the Downtown Plan EIR methodology for various aspects of cumulative analysis has been improved and fine-tuned for the Mission Bay EIR.

ORGANIZATION OF THE REPORT

To allow the reader to focus on each Alternative, the text is organized by Alternative wherever possible. The text for topics where the interim analysis year is discussed is organized by analysis year as well. Information common to all Alternatives generally is presented at the earliest point under each topic, followed by discussion of impacts particular to each Alternative in each analysis. The large amount of information collected and analyzed for this EIR necessitates a selective approach to presentation of data. Tables and figures included in the text highlight background information and reveal patterns in the effects of the Alternatives. Supplemental tables are referenced in Chapter XIV. Appendices and supporting documentation. The intent of this approach to data presentation is to avoid repetition of similar statistics and to communicate most economically the information of greatest interest to the reader. Supporting documentation, including detailed documentation of all analyses, is available for public review at the San Francisco Department of City Planning, 450 McAllister Street, San Francisco, California, 94102.

The EIR follows the organization given in the Table of Contents. Page, table and figure numbers reflect the chapter to which they pertain. Chapter VI. Environmental Setting, Impact and Mitigation is divided into major topics, such as VI.D. Community Services and Infrastructure, or VI.F. Air Quality. To provide the reader with continuity, the Impact and Mitigation sections for each major topic immediately follow the Setting for that topic. Notes are numbered in sequence through each topic and the Notes section may be found after the Mitigation section for that topic. In Chapters VI. and XIV., page, figure and table numbers reflect major topic subdivisions of each chapter.

An outline showing the subheadings used in the various chapters of the EIR is located in Chapter XIII. Bibliography and Report Outline at the end of this volume. It will assist the reader in finding specific information.

NOTE - Study Approach and Organization

/1/ The subarea designated "C-3 District" in this EIR is the same as the area analyzed in the Downtown Plan EIR: a larger area than that encompassed by the areas designated as the C-3 Districts in the Planning Code after adoption of the Downtown Plan.

V. THE EIR ALTERNATIVES AND APPROVAL PROCESS

The Mission Bay EIR considers and compares the effects of three Alternatives for development of the Project Area. Alternative A is a mixed-use development containing commercial and residential uses. Alternative B is predominantly housing and open space, containing less commercial space than does Alternative A. Alternative N is the No Project Alternative. It presents one likely development scenario that could be expected to occur in the future under the M-2 (Heavy Industrial) zoning and Central Waterfront Plan policies for the Project Area. Variants of the Alternatives are analyzed in Chapter VII. Variations on Alternatives, p. VII.1.

The first section, General Description of Land Uses, defines the land uses included in the Alternatives that will be used throughout the EIR. The second section, Characterization of the Alternatives, describes each Alternative and provides more-specific information in the form of comparative tables and land use maps. The third section, Business Activity, Employment, Housing, and Population, presents scenarios of building space, employment and population for each Alternative in the interim analysis year of 2000, and at build-out in 2020. The fourth section, Approval Process, summarizes the approval process for Mission Bay and the approvals and permits needed for each Alternative.

GENERAL DESCRIPTION OF LAND USES

This section presents a general description of each land use in the three Alternatives. Some particulars concerning a certain use may be different for master-planned Alternatives A and B than they are for Alternative N, which would be carried out under provisions of existing City Planning Code designations and Master Plan policies for the Project Area. Such differences are noted generally in the description of each use and shown more specifically in Table XIV.A.1, p. XIV.A.1, of Appendix A, The EIR Alternatives. Table XIV.A.1 uses height-and-bulk and land use designations from the City Planning Code to characterize (not define) the various neighborhoods and commercial districts under Alternatives A and B. How the Project Area actually would be rezoned is the subject of discussions between the City and project sponsor and would be part of the various approvals necessary for Mission Bay (see p. V.40). Table XIV.A.1 also gives the requirements of the existing zoning that would control development under Alternative N.

The descriptions in this section characterize building types that would be expected for each land use, indicating whether publicly accessible open space would be required and whether parking likely would be underground, structured or at grade. The types of uses and business activities assumed to occupy the space also are explained/1/. The descriptions are intended to be illustrative and not to catalog exhaustively every potential type of building or business that conceivably could occupy an area with a given land use designation.

COMMERCIAL

Office

The Mission Bay Alternatives would have varying amounts of office development. The office structures would be mid-rise (up to eight stories or from 105 to 110 feet) with large floor plates of up to 40,000 square feet that could be subdivided. Retail uses could be provided on the first floor. Publicly accessible open space would be provided in the form of plazas, landscaped pedestrian circulation, terraces, or small parks, at a rate of about 15% to 20% of land area. Parking generally would be structured, either as separate garage buildings or below office levels. Generally, rents would be anticipated to be lower than those for prime downtown office space and more competitive with those for suburban office development.

Office space would be suited for back-office functions of large companies, small and medium-sized headquarters, regional headquarters of larger companies, and small and medium-sized offices serving downtown San Francisco and other Bay Area clients. There would be the potential for build-to-suit owner-occupied buildings.

Service/Light Industrial/Research and Development (S/LI/RD)

Alternatives A and B would contain S/LI/RD space. The buildings would be low- to mid-rise (two to six stories or from 30 to 60 feet). They could be concrete tilt-up slab or other lower-cost construction, with large flexible-plan floor plates. Some outdoor areas could be used for storage of equipment and supplies. About 10% to 15% of the land area would be publicly accessible open space in the form of lawns, landscaped areas, or plazas. Parking generally would be structured or at grade.

S/LI/RD would be characterized by a variety of types and quality of structures and uses.

1. Service Industrial uses generally would occupy lower-floor space, often with open-air loading and storage. Activities could include:

   - service businesses supporting Mission Bay, downtown and nearby business areas, including repair, building maintenance, and protection / security services; vehicle / equipment leasing and rental, and businesses providing parts and supplies for business machinery and equipment;
   - data processing, communications, delivery, and reproduction services;
   - warehouse / distribution or transportation service companies; and
   - small light-manufacturing businesses.

2. Light Industrial / Research and Development uses would occupy space of higher-quality construction and higher-density development, with more emphasis on amenities and design. A mix of functions would be possible within a single building. Activities could include:

   - technology-oriented manufacturing companies (such as those involved in computer-related products, drugs and pharmaceuticals, medical equipment manufacturing, motion picture / video production, apparel, and printing and graphics), including start-up companies as well as moderate-sized companies interested in consolidating several functions at one location (such as research, design, assembly, and distribution);
   - research and development facilities for communications, biotechnology, computer and other electronics products companies, for example;
   - headquarters / administrative-support offices that are accessory to primary manufacturing, distribution, or research and development functions; and
   - institutional uses (such as medical or educational facilities, for example).

3. Wholesale / Showroom uses would occupy space with large open-plan floor plates, design features and amenities. Activities could include:

   - showrooms for such goods as furniture, fixtures, household goods and other office / home improvement or interior design items, fine arts and crafts, apparel, toys, gifts, and jewelry.

Retail

Retail space would be provided on the ground floor of some office and residential buildings or would occupy separate low-rise retail structures in all of the Alternatives. No open space would be associated with that use. Public on-street parking and off-street surface and structured parking would serve the retail establishments.

Retail activities would be oriented toward the convenience shopping needs of residents and workers in the Project Area and Nearby Areas. Some larger-scale retail stores serving a larger market area also could be included.

Hotel

In Alternative A only, a full-service, mid-rise (up to eight stories or 110 feet), 500-room hotel would contain about 400,000 gross square feet, including lobby, function and service areas and guest rooms. No public open space is assumed to be required for this use. Parking would be underground, structured or at grade. The hotel would serve both tourists and business travelers.

M-2 Industrial

The M-2 Industrial designation is based on existing M-2 zoning and applies only to the area west of Third Street in Alternative N, and some blocks north of the channel. Those areas would be expected to develop pursuant to existing zoning and Master Plan Policies into developments with the appearance of a business park consisting of lower-rise structures with a mix of light manufacturing, research and development, storage and distribution, small office and business support and service activities occupying the space. The characteristics of the space and activities would be most similar to S/LI/RD although M-2 Industrial development would be lower-density, with low-rise, lower-cost space and improvements tailored to meet the needs of lower-rent-paying business. No public open space would be provided. Parking generally would be at grade.

Port-Related/M-2

Port-Related/M-2 would apply to land east of Third Street in Alternatives A and N, reflecting existing M-2 zoning and the Bay Conservation and Development Commission (BCDC) Port Priority designation for most of that land. In Alternative A, a limited amount of land east of Third Street owned by the Port would be reserved for port-related storage. In Alternative N, Port-Related/M-2 activities would use low-rise building space for offices, warehouses and transit and storage sheds, and open land for fenced storage areas, paved outdoor work areas, and truck and rail yards. Some activities would continue to use existing building space and land area.

In Alternative N, Port-related/M-2 activities would include a mix of types of businesses somewhat similar to those currently operating in the Project Area. In addition to smaller manufacturing and construction-related operations, activities could include warehousing and distribution services, container freight stations, freight forwarders, cargo consolidators, importers/exporters, maritime equipment manufacture and supply, chandlers and other marine sales and service businesses, and ship/boat building and repair facilities. Some readily displaceable non-maritime activities are assumed to be allowed, while reserving the option for a marine container terminal at and adjacent to Piers 48 to 64. It is assumed that no major maritime or port-related development such as a container terminal would occur in that area during the time analyzed in the EIR.

RESIDENTIAL

Multi-family housing would be developed in Alternatives A and B in varying amounts and densities. Retail uses could be included on ground floors of some residential buildings. Publicly accessible open space in the form of landscaped pedestrian and seating areas, sun terraces and tot lots would be provided at ground level or on top of a parking level at a rate of about 5% of the land area. Parking generally would be structured or underground./2/

For purposes of analysis, low-density residential (LDR) construction is defined as ranging from two to four stories high and having up to 50 units per acre. Medium-density residential (MDR) construction would range from four to six stories and have up to 85 units per acre. Six- to eight-story medium-high density residential (MHDR) construction would have up to 120 units per acre. High-density residential (HDR) buildings, included in Alternative A, would be six to eight stories high with densities up to 150 units per acre. Residential buildings would go up to about 110 feet tall.

Within each density category, units in a range of sizes could be provided. Lower-density development would tend to have larger units than would higher-density development. For purposes of analysis, sizes of units are assumed to range from 500 gross square feet (gsf) to 1,500 gsf, with an average unit size of 850 gsf. The smaller units (500 to 650 gsf) would be studio and one-bedroom units. The average size units (850 gsf) would be large one-bedroom and small two-bedroom units. The largest units (1,100 to 1,500 gsf) would accommodate two, three and four bedrooms.

New housing in Mission Bay could include both owner-occupied and rental units. The housing would span a range of prices/rents, depending on unit size, location, amenities, and other characteristics. Overall, housing prices could range from about $100,000 to $300,000 (1984 dollars) and include some higher-priced units as well.

The analysis for the EIR Alternatives assumes that 30% of the residential units overall would be at affordable levels, in accordance with the Mayor's letter (see III. Background and Area Description, p. III.4 and VI.C. Housing and Population, p. VI.C.70). The project sponsor would provide half of the affordable units. The other half would be provided by the City through mechanisms yet to be developed. (See Chapter VII. Variations on Alternatives, p. VII.47, for a discussion of the implications of varying the percentage of affordable housing units.)

COMMUNITY FACILITIES

Community facilities generally would occupy low-rise (two- or three-story) buildings, but could go up to 70 feet. For most uses, the buildings would be two or three stories. This analysis focuses on the types or possible combinations of public services (such as a police or fire station or school) that would be needed in each Alternative. Estimated building space requirements of the various community services for each of the Alternatives, determined through the impact analysis, are assessed in light of the Community Facilities floor area assumed in each Alternative, and differences are identified.

Some publicly accessible open space could be included in Community Facilities, depending on the use. Surface parking would be provided.

OPEN SPACE

Open space would be of several major types:

- Open space in the form of parkland is characterized as active or passive. Active uses are defined as playing fields and courts for activities such as soccer, softball, football, baseball, basketball, and tennis. Passive recreational areas include lawns, wooded and landscaped acres, picnic areas, gardens, walking and biking paths, tot lots and playgrounds. Walking, sitting, flying kites or tossing frisbees would be representative passive uses.
- Wetlands would be created in Alternative B at three locations along the shore of the Bay and China Basin Channel.
- China Basin Channel would provide approximately 12 acres of water. It would be dredged in Alternative A. The treatment of the edges of the channel would vary among the Alternatives.

As noted in the descriptions above, some additional publicly accessible open space would be associated with office, S/LI/RD and residential uses. Other uses could provide open areas. Residential uses also would have private open space.

EXISTING USES INCORPORATED INTO THE ALTERNATIVES

Houseboats

With their owners represented by the Mission Creek Harbor Association, 20 houseboats are berthed in China Basin Channel as tenants of the Port of San Francisco. The number of houseboats remains unchanged in all the Alternatives. For purposes of analysis, the houseboats are considered a low density residential use.

Pleasure Craft

Owners of 35 pleasure craft berthed in the channel also are represented by the Mission Creek Harbor Association and are tenants of the Port. The number of pleasure-craft berths would be unchanged in Alternatives A and N, and reduced to 20 berths in Alternative B.

CalTrain Station

The CalTrain commute station serving the San Francisco Peninsula to San Jose is at Fourth and Townsend Streets. In Alternatives A and B, the station would be relocated to Seventh and Channel Streets; the intervening tracks would be removed and existing maintenance operations relocated./3/ An underground right-of-way would be reserved through the Project Area to accommodate any future extension of service downtown. In Alternative N, the commute station and associated maintenance operations would remain at the existing location.

Pump Station

The Channel Street Pump Station at the southwestern end of China Basin Channel is operated by the city's Clean Water Program. It pumps sewage to the Southeast Water Pollution Control Plant. It would be retained in all Alternatives.

I-280 TRANSFER CONCEPT PROGRAM

As part of the I-280 Transfer Concept Program (TCP), Caltrans plans to remove the I-280 freeway stub that runs from Third to Sixth Streets. It also plans to remove the Fourth Street off-ramp and construct new on- and off-ramps on King Street near Sixth Street.

CHARACTERIZATION OF THE ALTERNATIVES

This section provides a "walk" around the Project Area under each Alternative. The areas north of the Channel, west of Third Street afd east of Third Street are discussed. The discussion is intended to augment the land use plan provided for each Alternative; it is not intended to substitute for study of the land use plans and tables that are included here to facilitate comparison of specific features of the Alternatives. Table V.1 presents the land use program for each Alternative by building space. Table V.2, p. V.9, compares the Alternatives in terms of acres devoted to each land use. Table V.3, p. V.20 at the end of this subsection, presents and compares various features of the Alternatives, and includes additional detail on open space and transportation features in particular.

TABLE V.1: MISSION BAY BUILDING SPACE BY ALTERNATIVE, BUILD-OUT/2020
(Building Floor Area in Gross Square Feet, Unless Otherwise Indicated)

Land Use	Alternative A	Alternative B	Alternative N
Office	4,100,000	1,000,000	1,000,000
Service/Light Industrial/ Research & Development (S/LI/RD)	3,600,000	420,000	NA
Retail	250,000	300,000	100,000
Hotel	500 rooms (400,000)	NA	NA
M-2 Industrial	NA	NA	5,000,000
Port-Related/M-2	0	NA	1,048,000
Housing	7,700 du	10,000 du	NA
Low Density Residential (LDR)	300 du	620 du	
Medium Density Residential (MDR)	4,290 du	4,910 du	
Medium-High Density Residential (MHDR)	2,170 du	4,470 du	
High Density Residential (HDR)	940 du	0 du	
Community Facilities	125,000	293,000	42,000

(continued)

TABLE V.1: MISSION BAY BUILDING SPACE BY ALTERNATIVE, BUILD-OUT/2020 (Building Floor Area in Gross Square Feet, Unless Otherwise Indicated) (continued)

Land Use	Alternative A	Alternative B	Alternative N
Houseboats	20 berths	20 berths	20 berths
Pleasure Craft	35 berths	20 berths	35 berths
CalTrain Station	10,000	10,000	10,000
Pump Station	12,000	12,000	12,000

NA – Not applicable. This is used where the particular land use is not a part of the Alternative.
du – Dwelling units.

SOURCE: Environmental Science Associates, Inc., Recht Hausrath & Associates, and Department of City Planning.

TABLE V.2: MISSION BAY LAND AREA BY ALTERNATIVE, BUILD-OUT/2020 (Acres)

Land Use	Alternative A	Alternative B	Alternative N
Office/a/	26.8	5.9	5.2
Service/Light Industrial/ Research & Development (S/LI/RD)	50.2	6.0	NA
Retail/b/	0.4	2.2	1.7
Hotel	3.5	NA	NA
M-2 Industrial	NA	NA	129.2
Port Related/M-2	6.5	NA	65.5
Housing/a/	97.0	133.2	NA
Low Density Residential (LDR)	6.4	18.9	
Medium Density Residential (MDR)	62.8	73.2	
Medium-High Density Residential (MHDR)	20.8	41.1	
High Density Residential (HDR)	7.0	0	

(continued)

TABLE V.2: MISSION BAY LAND AREA BY ALTERNATIVE, BUILD-OUT/2020 (Acres) (continued)

	Alternative A	Alternative B	Alternative N
Community Facilities	2.4	5.6	0.8
Open Space /c/	55.3	94.1	17.2
Parkland	43.3	48.3	5.2
China Basin Channel	12.0	12.0	12.0
Wetlands	NA	33.8	NA
CalTrain Station and Rail Right-of-Way	13.7	12.3	36.1
Pump Station	1.5	1.5	1.5
Streets and Infrastructure	60.8	58.9	66.3
Vacant /d/	6.9	5.3	1.5
TOTAL ACRES	325	325	325

NA - Not applicable. This is used when the particular land use is not part of the Alternative.

/a/ May include ground-floor retail where shown in land use plans.
/b/ Includes retail not counted as part of other land uses.
/c/ Additional publicly accessible open space would be provided in the development of other uses. That is not added into the open space acreage to avoid double counting; it is included above as part of the acreage given for the specific use and is broken out here as follows:

	Alternative A	Alternative B	Alternative N
Open Space Associated with Other Uses	16.0	8.3	0
Housing	4.4	6.4	NA
Office	5.1	1.1	0
S/LI/RD	6.5	0.8	NA
Major Open Space	55.3	94.1	17.2
TOTAL OPEN SPACE	71.3	102.4	17.2

/d/ Those areas, generally located under freeway ramps, could be used for parking.

SOURCE: Environmental Science Associates, Inc.

ALTERNATIVE A

Alternative A would be a mixed-used development, combining residential and commercial uses (see Figure V.1, p. V.12). It is based on the land use program in the Environmental Evaluation Application submitted to the City by the project sponsor. It also is similar to the program described in the Mayor's letter and Mission Bay Plan, Proposal for Citizen Review, with additional S/LI/RD space occupying land outside the area covered by the Mayor's letter.

North of the Channel

The 4.1 million gsf of office space in Alternative A would be concentrated in six northern blocks of the Project Area fronting Townsend, King and Berry Streets. About 65,000 square feet of ground-floor retail space would front the streets at various locations on the office blocks.

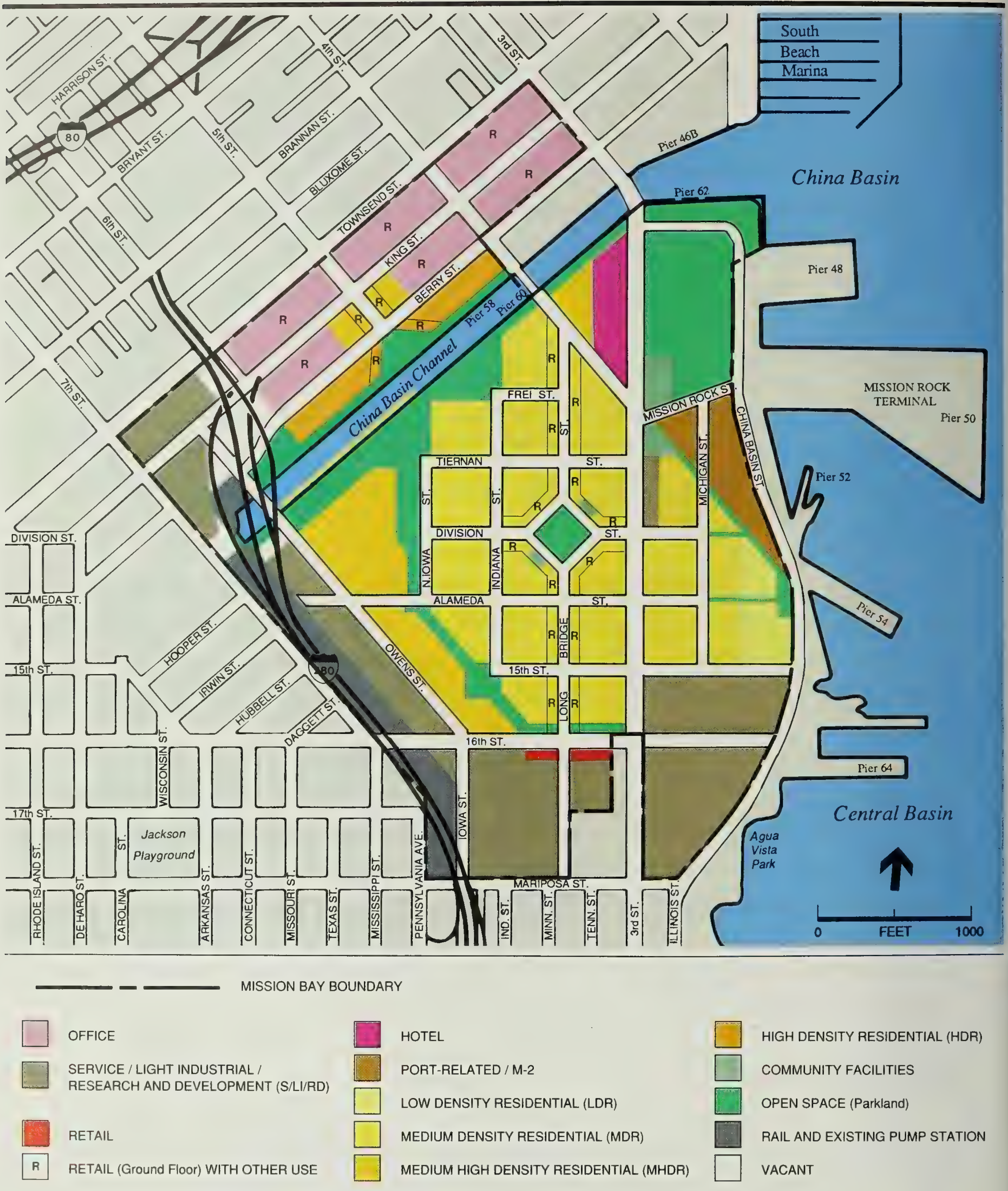
Under Alternative A, HDR and MHDR would be located along Fifth Street between King and Berry Streets and south of Berry Street along the north side of China Basin Channel. Ground-floor retail would front Fifth Street and extend south of Berry Street, fronting a portion of the four acres of landscaped open space that would occupy the north side of the channel from Fourth Street to I-280.

The I-280 stub and Fourth Street off-ramp would be removed and the interchange reconfigured to provide on- and off-ramps at King Street near Sixth Street as part of the I-280 Transfer Concept Program. West of the I-280 Sixth Street ramps, 640,000 gsf of S/LI/RD space would occupy the northwest corner of the Project Area. The Channel Street Pump Station would remain under the freeway ramps. The channel would be dredged as part of site preparation. The 20 houseboat berths and 35 pleasure-craft berths in the channel would be retained.

West of Third Street

An open space area would extend west to the Pump Station from Third Street along the channel past a new bridge at Owens Street. In the Banana Triangle, a 500-room hotel fronting Third Street would be backed by 250 units of MHDR.

Residential uses would dominate the center of the Project Area. About 3,230 units of MHDR would be concentrated between Owens and Third Streets. About 155,000 gsf of


South Beach Marina
China Basin
Pier 46B
Pier 62
Pier 48
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
Pier 58
Pier 60
China Basin Channel
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
FREI ST.
TIERNAN ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
16th ST.
17th ST.
MARIPOSA ST.
MISSION ROCK ST.
MICHIGAN ST.
CHINA BASIN ST.
N. IOWA ST.
INDIANA ST.
BRIDGE ST.
LONG ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
280
IOWA ST.
WISCONSIN ST.
Jackson Playground
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
R
0
FEET
1000
MISSION BAY BOUNDARY
OFFICE
SERVICE / LIGHT INDUSTRIAL / RESEARCH AND DEVELOPMENT (S/LI/RD)
RETAIL
R RETAIL (Ground Floor) WITH OTHER USE
HOTEL
PORT-RELATED / M-2
LOW DENSITY RESIDENTIAL (LDR)
MEDIUM DENSITY RESIDENTIAL (MDR)
MEDIUM HIGH DENSITY RESIDENTIAL (MHDR)
HIGH DENSITY RESIDENTIAL (HDR)
COMMUNITY FACILITIES
OPEN SPACE (Parkland)
RAIL AND EXISTING PUMP STATION
VACANT

Mission Bay

FIGURE V.1
ALTERNATIVE A LAND USE PLAN – BUILD-OUT / 2020

SOURCE: Environmental Science Associates, Inc.

ground-floor retail space would be located along the central north-south Long Bridge Street, focused around a two-acre public square. Two small parcels reserved for community facilities also would face the square. Running to the west of that central housing would be a curved pedestrian corridor linking Third and 16th Streets with open space along the channel. Between the pedestrian corridor and Owens Streets about 1,680 units of MHDR would be developed.

The CalTrain commute station would be moved to Seventh and Channel Streets. Under I-280, the commuter rail trackage would continue southeast and south along its existing alignment. About 490,000 gsf of S/LI/RD space would be constructed between the rail corridor and Owens Street. S/LI/RD uses would occupy the area south of 16th Street, with small structures containing about 10,000 gsf of retail uses fronting 16th.

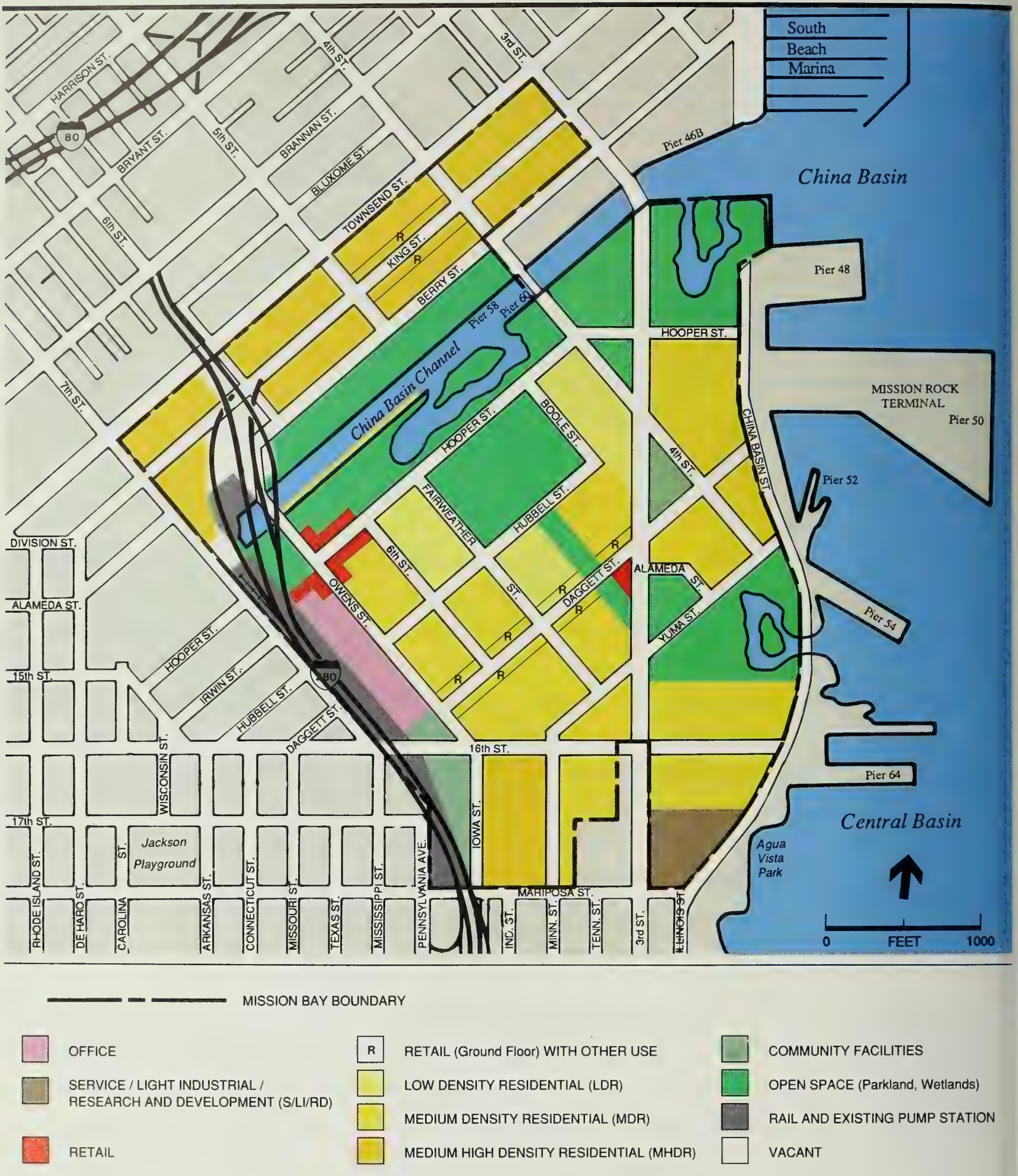
East of Third Street

The southern part of this area would be occupied by about 1,330,000 gsf of S/LI/RD. About 1,060 units of MDR concentrated in the center of the area would step down in height to 300 units of LDR facing China Basin Street. An open space buffer zone about 25 feet wide along the northeast side of the housing would connect with community facilities in restored Fire Station No. 30 (now vacant) and provide separation from the 6.5 acres of port-related storage to the northeast. About 80,000 gsf of S/LI/RD space would front Third Street just south of the old Fire Station at Mission Rock Street.

North of Mission Rock Street, 1.5 acres of community facilities would be backed by a 16.5-acre park. China Basin borders the park on the north.

ALTERNATIVE B

Alternative B would contain more housing and major open space and less commercial space than would Alternative A (see Figure V.2). With about 10,000 dwelling units, housing would predominate. Commercial space other than neighborhood-serving retail would be confined to two locations along the western and southeastern boundaries of the Project Area. Approximately one-third of the area would be devoted to public open space, including three wetlands habitats.


South
Beach
Marina
China Basin
Pier 46B
Pier 48
HOOPER ST.
MISSION ROCK
TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua
Vista
Park
0
FEET
1000
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
Pier 58
Pier 60
China Basin Channel
HOOPER ST.
BOOLE ST.
4th ST.
CHINA BASIN ST.
FAIRWEATHER
ST.
HUBBELL ST.
6th ST.
OWENS ST.
DAGGETT ST.
ALAMEDA
ST.
YUMA ST.
R
DIVISION ST.
ALAMEDA ST.
15th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
280
16th ST.
17th ST.
WISCONSIN ST.
Jackson
Playground
ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IOWA ST.
MARIPOSA ST.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
MISSION BAY BOUNDARY
OFFICE
SERVICE / LIGHT INDUSTRIAL / RESEARCH AND DEVELOPMENT (S/LI/RD)
RETAIL
R RETAIL (Ground Floor) WITH OTHER USE
LOW DENSITY RESIDENTIAL (LDR)
MEDIUM DENSITY RESIDENTIAL (MDR)
MEDIUM HIGH DENSITY RESIDENTIAL (MHDR)
COMMUNITY FACILITIES
OPEN SPACE (Parkland, Wetlands)
RAIL AND EXISTING PUMP STATION
VACANT

Mission Bay

FIGURE V.2
ALTERNATIVE B LAND USE PLAN – BUILD-OUT / 2020

SOURCE: Environmental Science Associates, Inc.

North of the Channel

About 3,680 units of MHDR would occupy the land north of Berry Street from Third Street west to Seventh Street. About 80,000 gsf of ground-floor retail uses would front King Street between Fourth and Fifth Streets. The 11 acres between Berry Street and the channel would be public open space.

The 20 houseboat berths would be retained, as would 20 of the 35 existing pleasure craft berths. The channel would not be dredged, and the Pump Station would remain under the I-280 freeway ramps.

As in Alternative A, the I-280 stub and Fourth Street off-ramps would be removed and the interchange reconfigured to provide on- and off-ramps at King Street near Sixth Street.

West of Third Street

Public open space would be developed along the entire southern channel frontage. A 7.3-acre park in the Banana Triangle would be across Fourth Street from a 13.2-acre mid-channel wetland. Construction of the wetland would require removal or relocation of sections of a large collection sewer that parallels the channel. South of the wetland across Hooper Street would be another 13.2-acre open-space area west of the mid-channel wetland. An additional 5.3 acres of open space would extend to the commuter rail lines and CalTrain commute station near Seventh and Channel Streets. Three corners of the intersection of Owens and Hooper Streets would be occupied by about 80,000 gsf of retail space in low-rise structures.

Under I-280, the commuter rail trackage would extend along the existing alignment. Between Owens Street and the rail lines, all office space in Alternative B, about one million gsf, would extend south from the Hooper Street intersection. South of the offices, about three acres of community facilities would occupy both sides of 16th Street between the rail lines and Owens and Iowa Streets.

About 2,870 units of MDR and LDR would occupy the center of the Project Area. Ground-floor retail would front both sides of Daggett Street. Taller, four-to six-story MDR buildings would be to the south and west, the low-rise two- to four-story LDR buildings would flank the central open space. A broad corridor about 125 feet wide would extend from the open space around the channel across Hubbell Street to the southeast to connect with the open areas east of Third Street. South of 16th Street, about 790 MHDR units and 340 MDR units would occupy the portion of the Project Area between Iowa and Third Streets.

East of Third Street

The southeast corner of the Project Area would contain about 420,000 gsf of S/LI/RD, the only site for that use in Alternative B. North of the S/LI/RD, 1,110 units of MDR would occupy 16 acres on both sides of 16th Street. A bayfront wetland would be created between that residential area and Yuma Street. The wetland would require off-site improvements along the bayfront to permit tidal access from the Bay to the wetland and a full bridge to carry China Basin Street and the Belt Line railroad over the tidal access. About 9.1 acres of park would be developed west of the wetland on both sides of Yuma Street.

North of the wetland and park, about 1,310 MDR units would occupy land fronting China Basin Street. Closed Firehouse No. 30 would be demolished and replaced with new structures containing community facilities on a 2.6-acre triangle formed by Third, Daggett and Fourth Streets. The third wetland, fronting China Basin and occupying 13.6 acres north of (realigned) Mission Rock Street, would be across Third Street from the park on the Banana Triangle, completing the open space starting on the south side of China Basin and surrounding the channel. The China Basin wetland would necessitate removal of Pier 62. China Basin Street would terminate at Pier 48.

ALTERNATIVE N - NO PROJECT

There are two ways of interpreting a No Project Alternative: one that assumes no physical change in the conditions that currently exist in the Project Area; and one that assumes development activity in the Project Area will continue in the future in response to economic and market conditions within the framework of existing zoning regulation and Master Plan policies. The "no change" scenario interprets a No Project Alternative in its most literal sense. It is implicit in the environmental setting sections for each of the topics addressed in this EIR, which contain detailed descriptions of existing conditions in the Project Area. By definition, the No Change - No Project alternative is analyzed fully in the environmental setting discussions in Chapter VI. Environmental Setting, Impact and Mitigation, which outline what conditions currently exist in the Project Area (and therefore the conditions that would continue to operate in the future). Therefore, the No Change – No Project Alternative is not addressed further in this EIR.

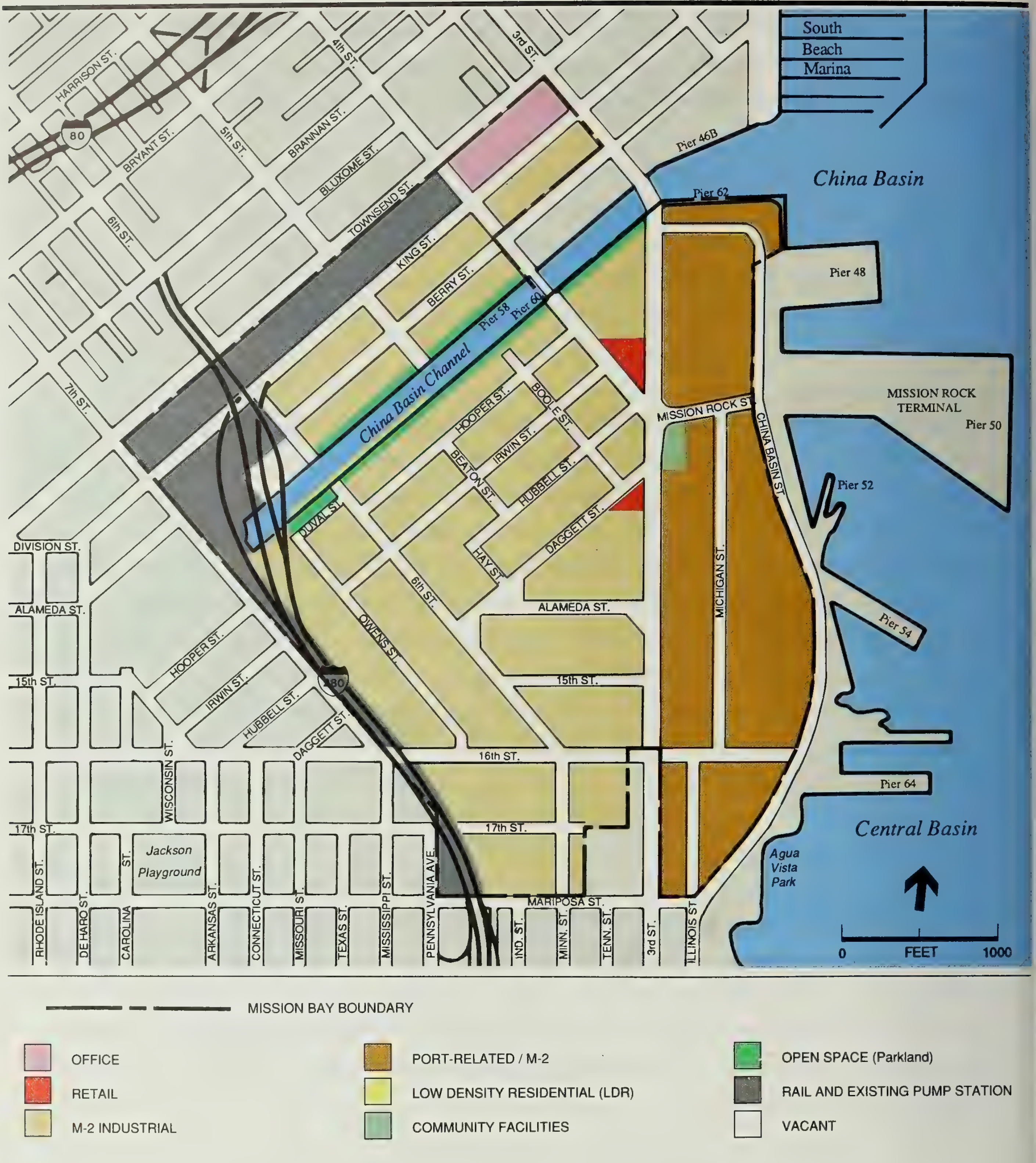
The other No Project Alternative, analyzed in this EIR as Alternative N, assumes continuation of existing predominantly M-2 (Heavy Industrial) zoning (see Figure V.3). The northernmost block is C-M (Commercial). A narrow band of P (Public) covers the area south of the channel from Fourth Street west to under the freeway. A triangular area containing about two acres at the southeastern corner of the property is also zoned P (Public).

Development under existing zoning and Master Plan policies could take many forms. Alternative N represents one likely scenario. Under Alternative N, almost all of the Project Area would be devoted to commercial/industrial uses. Most of the area would be devoted to lower-rise, lower-rent development accommodating a variety of business activities; there would be some limited office development. Part of the site would accommodate maritime-related businesses. M-2 Industrial and Port-related/M-2 would be expected to develop incrementally, more slowly than master-planned Alternatives A and B. They also would develop at a lower density (building area to land area) overall. Some retail development would be likely to occur, taking the form of smaller shops and restaurants oriented to workers in the area, as well as larger-scale stores serving a larger market area.

North of the Channel

The existing CalTrain commute station at Fourth and Townsend Streets would not be moved. Land now in rail use west of the station and north of King Street and under the I-280 freeway would remain in that use. Train maintenance operations would continue on the site. The I-280 stub and Fourth Street off-ramp would be removed and the freeway interchange at Sixth Street reconfigured to provide ramps serving King Street. The Pump Station would be retained.

The northernmost block would be occupied by about one million gross square feet of office space. The remainder of the area not in rail use would be part of the low-rise industrial and commercial development assumed to be built under existing M-2 zoning. A narrow band of public open space would front the north side of the channel. Existing houseboat and pleasure-craft berths in the channel would be retained.


South
Beach
Marina
China Basin
Pier 46B
Pier 62
Pier 48
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
China Basin Channel
Pier 58
Pier 60
HARRISON ST.
BRYANT ST.
80
4th ST.
3rd ST.
5th ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
HOOPER ST.
BOOLE ST.
IRWIN ST.
BEATON ST.
HUBBELL ST.
DAGGETT ST.
DUVAL ST.
HAY ST.
6th ST.
OWENS ST.
MISSION ROCK ST.
CHINA BASIN ST.
MICHIGAN ST.
ALAMEDA ST.
15th ST.
16th ST.
17th ST.
MARIPOSA ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
17th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
280
WISCONSIN ST.
Jackson Playground
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000
MISSION BAY BOUNDARY
OFFICE
RETAIL
M-2 INDUSTRIAL
PORT-RELATED / M-2
LOW DENSITY RESIDENTIAL (LDR)
COMMUNITY FACILITIES
OPEN SPACE (Parkland)
RAIL AND EXISTING PUMP STATION
VACANT

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE V.3
ALTERNATIVE N LAND USE PLAN –
BUILD-OUT / 2020

West of Third Street

An open-space strip fronting the south side of the channel would be continuous from the freeway to Third Street. Low-rise structures containing a total of about 100,000 gsf of retail space would be located at the southern corner of the Banana Triangle and the intersection of Daggett and Third Streets.

The rest of the area west of Third Street eventually would accommodate about 4.0 million gsf of low-rise, light industrial and commercial development. The M-2 Industrial development would have features attractive to a variety of users. The lower-rise structures would have flexible floor plans, with improvements tailored to the needs of lower-rent-paying businesses. Higher-cost amenities such as structured parking and open space would not be emphasized.

East of Third Street

Closed Fire Station No. 30 at Mission Rock and Third Streets would be redeveloped for community facilities use. The rest of the area east of Third Street would remain as Port-Related/M-2. For purposes of analysis, that use is assumed to develop over time as about one million gsf of building space and about 1.8 million gsf (about 41 acres) of accessory land area used for storage and outdoor activities.

The area east of Third Street would not be expected to undergo as major a change during the EIR analysis period as would the area west of Third. That is due to the complications inherent in multiple landownership (including the Port of San Francisco) and the land use/permit processing powers over waterfront property held by multiple agencies. In the absence of a coordinated development program, those and other market factors would limit the pace of development east of Third Street. Over time, there would be some intensification of activity compared to current levels, but no new development of the scale envisioned west of Third.

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES

Features	Alternative A	Alternative B	Alternative N
OPEN SPACE			
1. China Basin Channel			
1.1 Dredging/ Reconstruction	Channel to be dredged for bank improvements; minimal change in channel configuration; maintenance dredging to occur periodically.	No dredging in channel; wetlands to be dry dredged (excavated).	No dredging or change in channel configuration.
1.2 Water Level/ Circulation	Channel to be tidal. No change in natural circulation.	Channel to be tidal. No change in natural circulation. Wetlands to be tidal.	Channel to be tidal. No change in natural circulation.
1.3 Treatment of Edges of Channel/a/			
Division Street Outfall Area	Natural, soft edge and gabions./a/	Same as Alt. A.	Natural.
North Side	T-wall, decking and gabions./a/	Decking and gabions./a/	Natural, soft edge.
South Side	Decking and gabions./a/	Decking and gabions./a/	Natural, soft edge.
1.4 Public Access	All around channel; through vacant parcels around Pump Station.	Same as Alt. A.	Same as Alt. A.
2. Wetlands/b/	No wetlands.	Three wetlands.	No wetlands.
2.1 Dredging		Wetlands to be dry dredged (excavated).	

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

Features	Alternative A	Alternative B	Alternative N
2.2 Water Level/ Circulation		Wetlands to be tidal. Part of collection sewer to be removed or relocated to accommodate construction of mid-channel wetland west of Third Street.	
2.3 Edge Treatment		Soft, natural edge; berms with trees; nesting islands./b/	
3. Recreation/c/			
3.1 Active Sports Areas/d/	Active sports on approximately one-half the area bounded by Third, Mission Rock Streets and the channel; portions of the 13.3-acre area along the channel; and the one-acre area south of Berry Street near the freeway.	Active sports on 2.8 acres near Third and Yuma Streets; 6.1 acres north of the intersection of Third and Hooper Streets; and the 13.2-acre rectangular area between Hooper and Hubbell.	No active sports areas.
3.2 Passive Recreation Areas/e/	Passive recreation on the central diamond, on three acres north of the channel, and on most of the 13.3 acres south of the channel.	Passive recreation on remaining major open spaces (10.2 acres).	Narrow passive recreation areas (1.8 acres) along north and south sides of channel.
3.3 Paved Walking/ Biking Paths	Open space strips from closed Fire Station No. 30 to Alameda Street and from the houseboat area to 16th Street paved for walking and biking.	Open space strip from Third Street near Yuma northwest to Hooper Street paved for walking and biking.	None.

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

Features	Alternative A	Alternative B	Alternative N
HISTORIC STRUCTURES			
4. Buildings			
4.1 Closed Fire Station No. 30	To be retained at Fourth, Third and Mission Rock Streets and rehabilitated for community facilities use.	To be removed.	Same as Alt. A.
TRANSPORTATION			
5. Streets and Highways			
5.1 I-280 Stub	Mainline stub from Channel Street (approximately) to current terminus at Third between Berry and King Streets, along with off-ramp at Fourth and Berry Streets, removed.	Same as Alt. A.	Same as Alt. A.
5.2 I-280 Ramps	New ramps built at Sixth and King Streets to provide direct on and off access from King Street with the ramps touching down to grade between Fifth and Sixth Streets.	Same as Alt. A.	Same as Alt. A.
5.3 Street Grid			
North of the Channel	All streets in the Project Area to follow the South-of-Market grid, and all streets continuous except Berry Street west of Sixth Street, and Fifth Street, south of Berry Street./f/	Same as Alt. A.	Same as Alt. A, except Berry Street also discontinuous west of Fourth Street.

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

Features	Alternative A	Alternative B	Alternative N
	Owens Street extended north of Channel to King Street.	Same as Alt. A.	Owens Street not to exist north of channel.
South of the Channel	The (predominantly) Third Street grid to meet the South-of-Market grid at Owens Street.	South-of-Market grid. grid.	Based on platted streets, the mixed grid includes the South-of-Market grid meeting the Third Street grid at Daggett Street. Sixth Street not to connect to Owens Street.
5.4 Street Operations			
Directionality	All streets to provide two-way traffic operations except: - Third Street one-way northbound north of King Street; - Fourth Street one-way southbound north of King Street; - Seventh Street one-way northbound north of Townsend Street; - Eighth and Tenth Streets one-way southbound north of Division Street; and - Ninth Street one-way northbound north of Division Street.	Same as Alt. A.	Same as Alt. A.

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

Features	Alternative A	Alternative B	Alternative N
Number of Lanes	Streets to contain four travel lanes: - Third, - Fourth (north of channel); - Fifth (north of Berry); - Seventh (north of 16th); - 16th; - Townsend, Owens, and King.	Same as Alt. A.	Same as Alt. A, except Seventh Street not restriped and so contains two travel lanes.
	All other streets to contain two travel lanes (one travel lane in each direction).	Same as Alt. A.	Same as Alt. A.
5.5 Bridges over China Basin Channel	Bridge added at Owens Street (two lanes northbound, two lanes southbound). Existing bridges retained at Third Street (two lanes northbound and two lanes southbound) and Fourth Street (two lanes southbound and one lane northbound).	Same as Alt. A.	Existing Third Street (two lanes southbound, two lanes northbound) and Fourth Street (two lanes southbound, one lane northbound).
5.6 Other Bridges	None.	Bridge to carry China Basin Street and Belt Line railroad across tidal access to wetland south of Pier 54.	None.
5.7 Truck Routes/g/	Third Street designated as STAA (two-trailer) truck route./h/	Same as Alt. A.	Same as Alt. A.

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

Features	Alternative A	Alternative B	Alternative N
5.7 Truck Routes (continued)	Streets where other trucks permitted: - Fourth (north of Third); - Mission Rock; - Owens; - Iowa; - King; - Townsend; - Mariposa; - China Basin; and - 16th Streets.	Same as Alt. A.	All streets designated as truck routes.
6. Transit			
6.1 CalTrain			
Station Location	Existing terminal at Fourth and Townsend Streets closed. Tracks removed from Fourth and Townsend Streets west and south to about Seventh and Channel Streets. New terminal located at (approximately) Seventh and Channel Streets.	Same as Alt. A.	Existing terminal at Fourth and Townsend Streets and tracks serving it retained.
Headways and Capacity	During peak periods, unchanged from existing.	Same as Alt. A.	Same as Alt. A.
6.2 MUNI			
Light Rail (MUNI Metro)/i/			
Station Locations	King Street west of Fourth, King Street west of Sixth, and Seventh and Channel Streets (CalTrain station).	Same as Alt. A.	King Street west of Fourth Street (CalTrain terminal).

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

Features	Alternative A	Alternative B	Alternative N
Lines -- Headways and Capacity	During peak periods, 50% of MUNI Metro trains operating through the Market Street subway to serve all Mission Bay stations.	Same as Alt. A.	Same as Alt. A, but only as far west as existing CalTrain station at Fourth and Townsend Streets.
Bus Service/i/			
Routes	22-FILLMORE, 30-STOCKTON, 47-VAN NESS extended into Mission Bay.	Same as Alt. A.	Service unchanged from existing.
	30-STOCKTON, 47-VAN NESS, 76-MARIN HEADLANDS and 81X-BATTERY-SANSOME EXPRESS extended to serve CalTrain station at Seventh and Channel.	Same as Alt. A.	Service unchanged from existing.
	42-DOWNTOWN LOOP realigned to Bryant/ Harrison Streets. 32-EMBARCADERO and 80X-GATEWAY EXPRESS discontinued. 15-THIRD unchanged.	Same as Alt. A.	Service unchanged from existing.
Headways and Capacity	Same service levels as scheduled on July 1986, but with articulated equipment on all lines except 76-MARIN HEADLANDS.	Same as Alt. A.	Same as Alt. A.
7. Rail Freight			
7.1 Companies	Southern Pacific, Santa Fe and San Francisco Belt railroads.	Same as Alt. A.	Same as Alt. A.

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

Features	Alternative A	Alternative B	Alternative N
7.2 Trackage/j/	Maintained by Southern Pacific (SP) east of Seventh Street north to Channel Street (for passenger service); on Illinois Street north to China Basin Street; along new trackage on China Basin Street connecting to San Francisco Belt on Third Street; mainline SP connection made along Indiana Street track.	Same as Alt. A.	Existing trackage could remain where development does not take place. SP mainline connection would continue to be at 16th Street.
8. Bicycle Routes	Designated and signed - on Third, Fourth, Berry, and 16th Streets.	Same as Alt. A.	Designated and signed - on Third, Fourth and 16th Streets.

/a/ Edge treatments are briefly defined as follows:

T-wall:	A T-wall is a concrete retaining wall, constructed in the shape of an inverted "T," which would be used to provide support for hard-edged, straight sides along China Basin Channel. The base of the "T" would be longer than the vertical. The part of the base pointing toward the channel would serve as a hard channel bottom adjacent to the channel edge. The other branch of the base would be buried landward of the channel. Dredging along the T-wall would be done using a drag-line after the T-wall had been constructed.
Gabion:	A gabion consists of broken rock held in place by firmly anchored wire or cable netting. It would be used to prevent slumping and erosion of exposed mud.
Decking:	Decking would consist of wooden walkways along the channel. The decking would be supported on concrete footings adjacent to the channel and on piers sunk near the edge of the channel.

/b/ Configuration of wetlands is discussed in "Wetlands/Playfields," special study for Mission Bay, prepared for Department of City Planning, September 1986.

/c/ Recreational areas are described in greater detail in VI.D. Community Services and Infrastructure, Recreation and Parks, p. VI.D.61.

/d/ Active sports uses are playing fields and courts for activities such as football, baseball, soccer, softball, and tennis.

(continued)

TABLE V.3: FEATURES OF THE MISSION BAY ALTERNATIVES (continued)

/e/ Passive recreational areas include lawns, wooded and landscaped areas, picnic areas, benches, gardens, walking and biking paths, tot lots and play equipment areas; there may be fountains or other small water features. Walking, sitting, flying kites or tossing frisbees would be representative activities in open areas. Tot lots and play areas would include equipment such as slides, swings, climbers, play sculptures, sand areas, etc.

/f/ North of the Project Area, Sixth Street would be discontinuous at Brannan Street, where the I-280 ramps touch down to grade.

/g/ STAA truck routes can be designated by local jurisdictions for use by the two-trailer trucks permitted by the (Federal) Surface Transportation Assistance Act (STAA) of 1982.

/h/ East of the Project Area, King Street between Third Street and the Embarcadero would be designated as an STAA truck route.

/i/ Source: Memorandum dated July 29, 1986 from Lee Knight, San Francisco Public Utilities Commission, to Robert Harrison, City Agency Transportation Planning Committee for Mission Bay.

/j/ Sources: Memorandum dated April 23, 1986 from Dan Smith, DKS Associates, to Don Marini, Santa Fe Pacific Realty Corporation; and San Francisco Department of City Planning.

SOURCE: Environmental Science Associates, Inc. and Barton-Aschman Associates.

BUSINESS ACTIVITY, EMPLOYMENT, HOUSING, AND POPULATION

This section presents scenarios of building space, business activity, employment, housing, and population for each of the Mission Bay Alternatives. The scenarios take the land use programs described above one step further to provide estimates of the numbers of jobs and residents associated with each Alternative at build-out (2020) and the interim analysis year (2000).

For purposes of the EIR, reasonable scenarios of types of business activities and households in the Project Area were developed for each Alternative. The numbers used to quantify employment and population for each Alternative should be considered illustrative of those scenarios. The scenarios for the Project Area are based on consideration of the land use programs in the Alternatives, characteristics of the Mission Bay site vis-a-vis other locations in the Downtown & Vicinity, and the broader context of employment and population growth trends and development potentials in the Downtown & Vicinity, the rest of the City, and the rest of the Bay Area region./4/

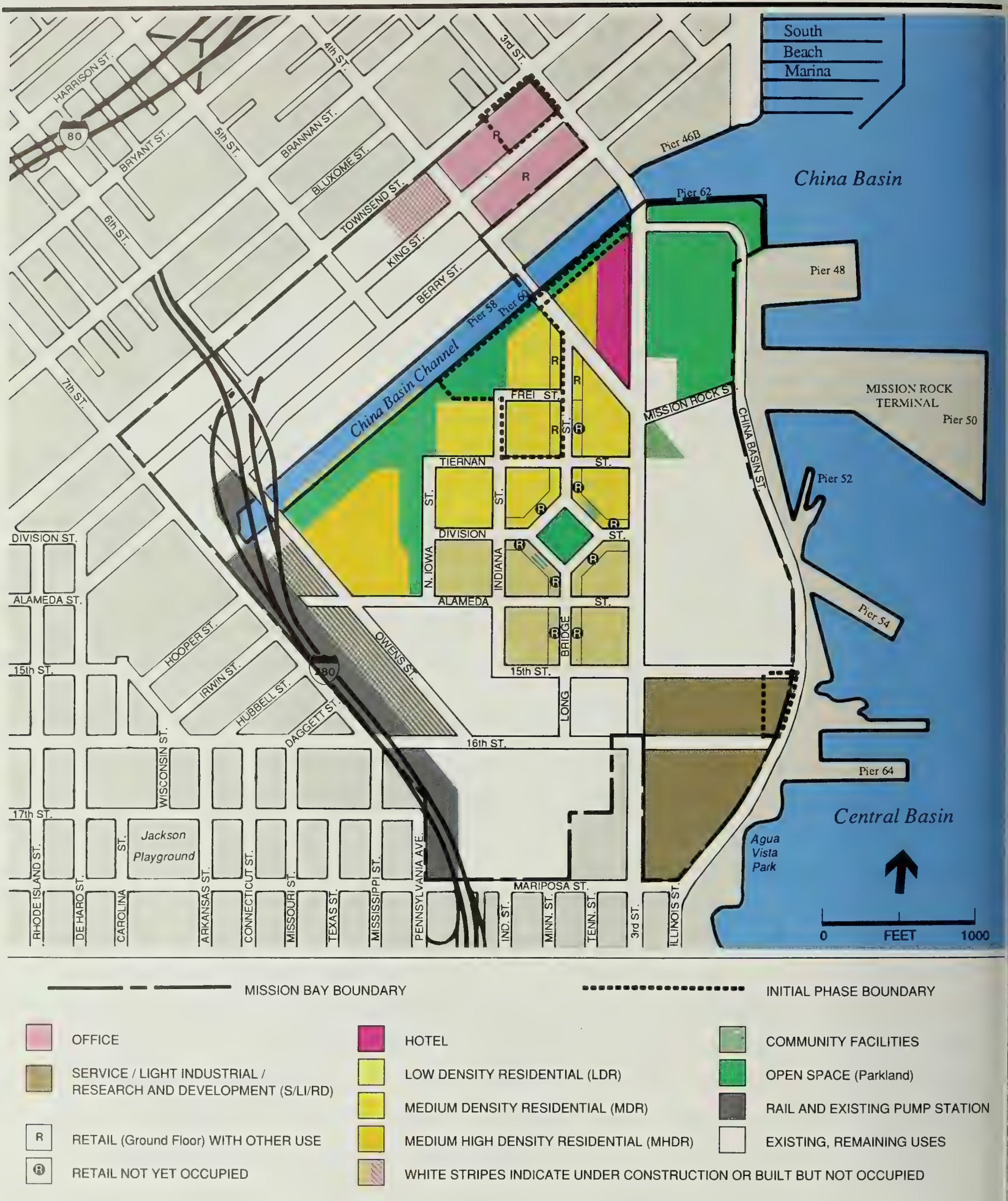
DEVELOPMENT PATTERN FOR THE INTERIM ANALYSIS YEAR (2000)

Figures V.4, V.5, and V.6, pp. V.30-V.32, show development in the Project Area assumed for purposes of analysis to have occurred by 2000 for Alternatives A, B and N, respectively. For the year 2000 scenarios, major transportation and infrastructure changes such as CalTrain Station relocation, MUNI Metro extension to the CalTrain Station, I-280 stub removal and completion of new I-280 ramps at King Street, are assumed to have been completed by 1995. The location of development in the year 2000 is based on those transportation and infrastructure considerations as well as on a logical development sequence in terms of marketing sites, ease of access for site preparation and construction, and existing long-term leases in the Project Area. Representing a range of types of development among a range of potential sites was also a factor in specifying the development patterns for 2000. The year 2000 scenarios are illustrative of a range of potential development schemes. Although the specific development patterns bear some relationship to the logic of the land use program for each Alternative, they are not meant to preclude other approaches to developing the Project Area.

Figures V.4, V.5, and V.6 show the locations of space that would built by 2000; space that would be under construction or built but unoccupied is indicated by white stripes.

Initial Phase of Development

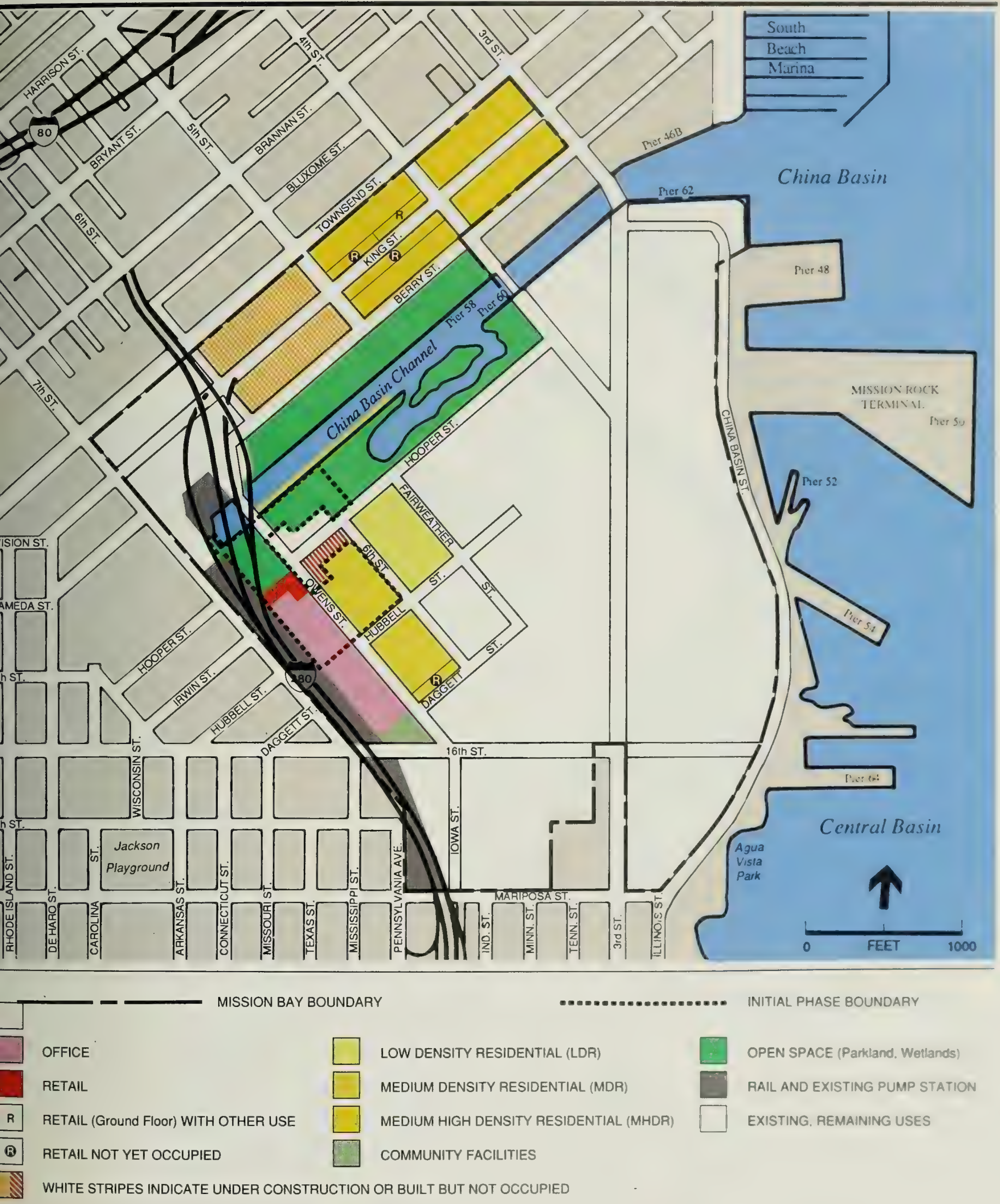
Figures V.4 and V.5 also show the location of space assumed to be built in the initial phase of development for master-planned Alternatives A and B, respectively. Development of the initial phase is assumed to begin immediately after necessary project approvals have been obtained. Occupancy could begin as early as 1990. Due to the mix of housing types and the phasing plan for each Alternative, Alternative A is assumed to develop more housing and commercial space than Alternative B would in the initial phase. Because development under Alternative N, the No Project Alternative, would proceed piecemeal, no initial phase has been identified. Table V.4, p. V.33, shows the amount of building space and open space assumed to be developed in the initial phase.


South Beach Marina
China Basin
Pier 46B
Pier 62
Pier 48
Pier 58
Pier 60
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
China Basin Channel
HARRISON ST.
BRYANT ST.
80
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
FREI ST.
TIERNAN ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
16th ST.
17th ST.
MARIPOSA ST.
MISSION ROCK ST.
CHINA BASIN ST.
N. IOWA ST.
INDIANA ST.
BRIDGE ST.
LONG
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
280
Jackson Playground
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
R
0 FEET 1000
MISSION BAY BOUNDARY
INITIAL PHASE BOUNDARY
OFFICE
HOTEL
COMMUNITY FACILITIES
SERVICE / LIGHT INDUSTRIAL / RESEARCH AND DEVELOPMENT (S/LI/RD)
LOW DENSITY RESIDENTIAL (LDR)
OPEN SPACE (Parkland)
MEDIUM DENSITY RESIDENTIAL (MDR)
RAIL AND EXISTING PUMP STATION
R RETAIL (Ground Floor) WITH OTHER USE
MEDIUM HIGH DENSITY RESIDENTIAL (MHDR)
EXISTING, REMAINING USES
Ⓡ RETAIL NOT YET OCCUPIED
WHITE STRIPES INDICATE UNDER CONSTRUCTION OR BUILT BUT NOT OCCUPIED

Mission Bay

FIGURE V.4
ALTERNATIVE A LAND USE PLAN – 2000

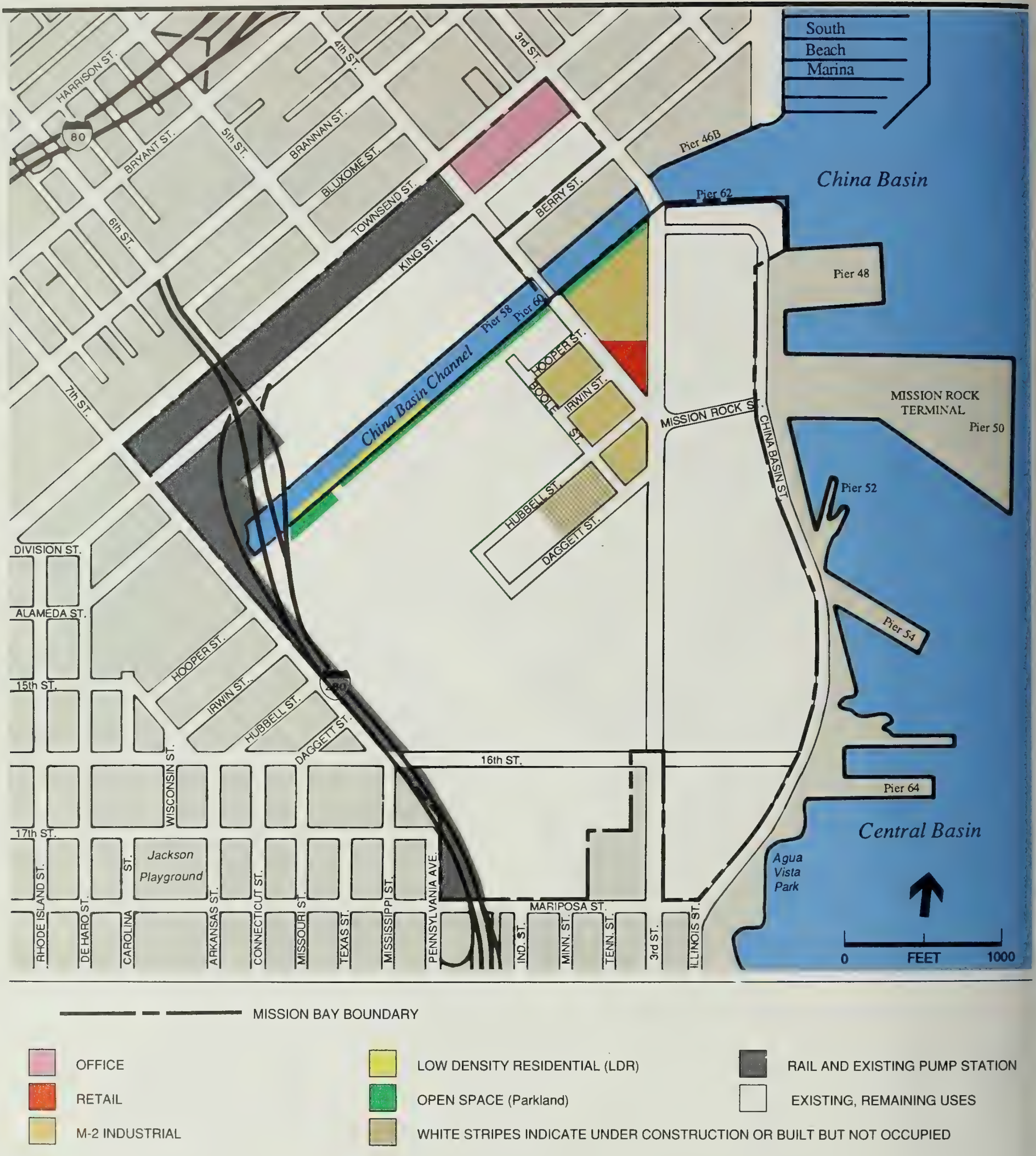
SOURCE: Environmental Science Associates, Inc.


South Beach Marina
China Basin
Central Basin
Pier 46B
Pier 62
Pier 48
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Pier 58
Pier 60
China Basin Channel
Agua Vista Park
HARRISON ST.
80
BRYANT ST.
4th ST.
3rd ST.
5th ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
HOOPER ST.
FAIRWEATHER
6th ST.
OWENS ST.
HUBBELL
ST.
ST.
ST.
DAGGETT
CHINA BASIN ST.
ISION ST.
AMEDA ST.
h ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
280
16th ST.
h ST.
WISCONSIN ST.
Jackson Playground
ST.
IOWA ST.
MARIPOSA ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
R
0
FEET
1000
MISSION BAY BOUNDARY
INITIAL PHASE BOUNDARY
OFFICE
RETAIL
R RETAIL (Ground Floor) WITH OTHER USE
Ⓡ RETAIL NOT YET OCCUPIED
WHITE STRIPES INDICATE UNDER CONSTRUCTION OR BUILT BUT NOT OCCUPIED
LOW DENSITY RESIDENTIAL (LDR)
MEDIUM DENSITY RESIDENTIAL (MDR)
MEDIUM HIGH DENSITY RESIDENTIAL (MHDR)
COMMUNITY FACILITIES
OPEN SPACE (Parkland, Wetlands)
RAIL AND EXISTING PUMP STATION
EXISTING, REMAINING USES

ission Bay

URCE: Environmental Science Associates, Inc.

FIGURE V.5
ALTERNATIVE B LAND USE PLAN – 2000


South Beach Marina
China Basin
Pier 46B
Pier 62
Pier 48
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
Pier 58
Pier 60
China Basin Channel
HARRISON ST.
BRYANT ST.
80
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
3rd ST.
4th ST.
5th ST.
6th ST.
7th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
BOOLE ST.
MISSION ROCK ST.
CHINA BASIN ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
16th ST.
17th ST.
280
WISCONSIN ST.
Jackson Playground
MARIPOSA ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000
MISSION BAY BOUNDARY
OFFICE
RETAIL
M-2 INDUSTRIAL
LOW DENSITY RESIDENTIAL (LDR)
OPEN SPACE (Parkland)
WHITE STRIPES INDICATE UNDER CONSTRUCTION OR BUILT BUT NOT OCCUPIED
RAIL AND EXISTING PUMP STATION
EXISTING, REMAINING USES

Mission Bay

FIGURE V.6
ALTERNATIVE N LAND USE PLAN – 2000

SOURCE: Environmental Science Associates, Inc.

TABLE V.4: SPACE BY USE IN INITIAL PHASE OF MISSION BAY DEVELOPMENT, ALTERNATIVES A AND B (Gross Square Feet, Unless Otherwise Indicated)

Land Use	Alternative A	Alternative B
Office	400,000	365,000
Service/Light/Industrial Research/and Development (S/LI/RD)	50,000	0
Retail	27,000	20,000
Medium Density Residential MDR	500 du	400 du
Open Space/a/ Parkland	5.6 acres	5.3 acres

du - Dwelling units.

/a/ Approximately 0.6 acres and 0.7 acres of open space associated with other uses would be provided in Alternatives A and B, respectively.

SOURCE: Environmental Science Associates, Inc.

BUSINESS ACTIVITY AND EMPLOYMENT

Tables V.5 and V.6 present estimates by use of building space and associated employment, respectively, for Mission Bay Alternatives in 2000 and at build-out. The estimates are based on the amount of space by use identified in the land use programs for each Alternative described in the preceding section, Characterization of the Alternatives (see Table V.1, p. V.8). Employment density factors (gross square feet of space per worker) are used to convert amounts of space by use to estimates of employment by use. Employment density varies by use, with office uses more dense than S/LI/RD or M-2 uses, for example (i.e., more workers in a given amount of space or, in terms of space, fewer square feet per worker). For office and S/LI/RD uses, a 5% vacancy rate is assumed The space shown for those uses on the building space tables is total space developed, 95% of which is assumed to be occupied. Table XIV.A.2, p. XIV.A.10 in Appendix A, presents employment density factors associated with various land uses in the Alternatives.

TABLE V.5: MISSION BAY SPACE BY USE, BY ALTERNATIVE, 2000 AND BUILD-OUT/2020 (Gross Square Feet, Unless Otherwise Indicated)

Land Use	Alternative A		Alternative B		Alternative N	
	2000	2020	2000	2020	2000	2020
Office	1,440,000	4,100,000	1,000,000	1,000,000	1,000,000	1,000,000
S/LI/RD	1,330,000	3,600,000	0	420,000	NA	NA
Retail	50,000	250,000	40,000	300,000	65,000	100,000
Hotel	500 rooms	500 rooms (400,000)	NA (400,000)	NA	NA	NA
M-2 Industrial/a/	NA	NA	NA	NA	550,000	5,000,000
Port-Related/M-2/a/	0	0/283,000 (Bldg) (Land)	NA	NA	0 (Bldg) (Land)	1,048,000/1,805,000
Community Facilities/b/	37,000	125,000	42,000	293,000	0	42,000
Open Space/c/						
Parkland	33.4 acres	43.3 acres	16.3 acres	48.3 acres	3.4 acres	5.2 acres
Wetlands	NA	NA	13.2 acres	33.8 acres	NA	NA
China Basin Channel	12.0 acres	12.0 acres	12.0 acres	12.0 acres	12.0 acres	12.0 acres
Pleasure Craft	35 berths	35 berths	20 berths	20 berths	35 berths	35 berths
CalTrain Station/d/	10,000/587,000 (Bldg) (Land)	10,000/587,000 (Bldg) (Land)	10,000/526,000 (Bldg) (Land)	10,000/526,000 (Bldg) (Land)	10,000/1,563,000 (Bldg) (Land)	10,000/1,563,000 (Bldg) (Land)
Pump Station/d/	12,000/ 53,000 (Bldg) (Land)	12,000/ 53,000 (Bldg) (Land)	12,000/ 53,000 (Bldg) (Land)	12,000/ 53,000 (Bldg) (Land)	12,000/ 53,000 (Bldg) (Land)	12,000/ 53,000 (Bldg) (Land)
Existing Remaining East of Third/a,e/	176,000/270,000 (Bldg) (Land)	NA	397,000/139,000 (Bldg) (Land)	NA	397,000/ 139,000 (Bldg) (Land)	NA
Existing Remaining West of Third/a,e/	264,000/181,000 (Bldg) (Land)	NA	264,000/181,000 (Bldg) (Land)	NA	980,000/ 988,000 (Bldg) (Land)	NA

NOTE: The numbers in the columns headed "2000" in this table represent development by the year 2000. They do not include space under construction in 2000. Table V.7 presents residential development for each Alternative in 2000 and 2020.

NA - (Not Applicable). This is used where the particular land use is not a part of the Alternative.

/a/ "Existing Remaining" in 2000 includes M-2 Industrial and Port-Related/M-2 types of space and activities. They are categorized as Existing Remaining in 2000. To the extent they would continue to operate in the Project Area at buildout in 2020, they are categorized as M-2 Industrial or Port-Related/M-2 uses for that analysis year.

/b/ Community facilities are defined generically here. Depending on the Alternative, 0.7 to 0.8 acre is assumed to be developed in 2000.

/c/ Additional publicly accessible open space would be associated with office, S/LI/RD, and residential uses. See Table V.2, note /c/.

/d/ The estimate of space by use includes a component of land area separate from building area. Land area represents land, exclusive of buildings, used by these operations in the Project Area.

/e/ "Existing remaining" is an interim designation for the activities similar to those currently in the Mission Bay Project Area that are assumed to continue to operate in certain locations there in 2000, given the development patterns of the Alternatives. Both land and buildings are used by businesses in this category in the conduct of their operations, so the estimate of space by use includes a component of land area separate from building area.

SOURCE: Recht Hausrath & Associates and Environmental Science Associates, Inc.

TABLE V.6: MISSION BAY EMPLOYMENT BY USE, BY ALTERNATIVE, 2000 AND BUILD-OUT/2020

Land Use	Alternative A		Alternative B		Alternative N	
	2000	2020	2000	2020	2000	2020
Office	5,000	14,200	3,500	3,500	3,500	3,500
S/LI/RD	3,100	8,400	0	900	NA	NA
Retail	140	700	110	800	180	300
Hotel	370	370	NA	NA	NA	NA
M-2 Industrial/a/	NA	NA	NA	NA	1,300	11,600
Port-Related/M-2/a/	NA	0	NA	NA	NA	1,150
Housing-Related	120	310	110	400	NA	NA
Community Facilities/ Open Space	50	160	60	380	0	50
Pump Station and CalTrain Station	90	90	90	90	160	160
Building Maintenance/ Security/Parking	230	750	90	160	130	490
Construction/b/	480	NA	300	NA	120	NA
Existing Remaining East of Third/a,c/	100	NA	660	NA	800	NA
Existing Remaining West of Third/a,c/	250	NA	250	NA	920	NA
TOTAL	9,930	24,980	5,170	6,230	7,110	17,250

NA - Not Applicable. This is used where the particular land use is not a part of the Alternative.

/a/ "Existing Remaining" in 2000 includes M-2 Industrial and Port-Related/M-2 types of business and employment. They are categorized as Existing Remaining in 2000. To the extent they would continue to operate in the Project Area at build-out/2020, they are categorized as M-2 Industrial or Port-Related/M-2 uses for that year.

/b/ Mission Bay construction employment is measured in person-years of construction labor. Over the course of the development period, Alternative A would generate about 13,000 person-years of construction employment, Alternative B about 10,000 person years, and Alternative N about 4,000 person-years. For build-out/2020, there would be no more construction employment in the Project Area since the area would be fully developed. The estimate of construction employment for 2000 in the table identifies the magnitude of person-years expected on an annual basis throughout the development period. (The annual estimate for 2000 is an average for all construction activity except that associated with major infrastructure improvements completed in the early development phases.)

/c/ "Existing Remaining" is an interim designation for activities similar to those currently located in the Mission Bay Project Area that are assumed to continue to operate in certain locations there in 2000 given the development patterns of the Alternatives.

SOURCE: Recht Hausrath & Associates

2000

By the year 2000, the development programs for commercial uses would not differ substantially among the Alternatives. Alternative A would have the largest amount of employment and Alternative B the smallest. In both Alternatives B and N, all office development (shown as one million square feet of office space) would be completed before 2000. Because the land use program in Alternative B is devoted largely to housing, and the commercial component is small relative to other Alternatives, almost all employment growth in the Project Area under that Alternative would occur by 2000. Employment estimates for Alternative B in 2000 represent 80% of total employment at build-out, while in Alternatives A and N, the interim-year employment estimates represent about 40% of total employment at build-out.

New activity in Mission Bay would occur in a variety of locations. All Alternatives show development proceeding north of the channel by 2000. The blocks along Townsend and King Streets, moving east from Third Street, would be among the first to be developed. South of the channel and west of Third Street, the development patterns would vary. Alternative A would have extensive new development and construction underway, taking up most of the central portion of the Project Area. In Alternative B, new development by 2000 would be concentrated at the western boundary of the Project Area, near the relocated train station. In Alternative N, that part of the Project Area would be left undisturbed as development proceeded gradually from the northern edge of the Project Area closest to South of Market. Alternatives B and N would have no new development east of Third Street by 2000. Under Alternative A, both the northern and southern parts of that area would be developed for new uses by 2000, leaving about one-third of the area for later phases of development.

Year 2000 development patterns affect how much of the Project Area would remain available during early phases of Mission Bay development for continued use by distribution, transportation, storage, and other activities of the types currently operating in the Project Area. The designation "Existing Remaining" on Tables V.2 and V.3 identifies that category of business activity in the Project Area for the interim analysis year (2000). The designation is not intended to imply that the same businesses would necessarily still be there in 2000. Businesses similar to those currently located in Mission Bay would continue to find it an attractive option to the extent undeveloped portions of the Project Area would continue to have somewhat similar features in terms of types of facilities and costs of space (in real terms) relative to other locations. Some of those businesses could be described by the categories Port-Related/M-2 or M-2 Industrial. In the year 2000 estimates, they are categorized as Existing Remaining, however. The "Existing Remaining" category is not illustrated specifically on the year 2000 maps, but that type of space and employment would be located where no new development is shown.

Table V.6 shows an estimate of construction employment in the Project Area for the year 2000. The category identifies person-years of construction labor associated with development of the Project Area on an annual basis. VI.B. Land Use, Business Activity, and Employment identifies total person-years of construction labor for both building development and infrastructure improvements over the total build-out period for each Alternative (see Table V.3, p. VI.20, and associated text). The interim-year estimates in Table V.6, p. V.35, represent an average annual estimate for construction labor for all except the major infrastructure items completed in the early phases of development.

Build-Out/2020

Tables V.5 and V.6, pp. V.34 and V.35, also present the build-out scenarios of commercial building space and employment, respectively, for the three Alternatives. The differences among the Alternatives are substantially greater at build-out than in the interim analysis year (2000). At build-out, Alternative A would represent about 25,000 jobs, while Alternative B would represent about 6,000 jobs (one-quarter of the amount in Alternative A). Alternative N would represent about 17,000 jobs.

All Alternatives would include office activity and employment. Alternative A would have by far the largest amount; office jobs would be over half of total employment in that Alternative. Alternatives B and N would have substantially less office development. Because of the relatively small amount of commercial development in Alternative B, office employment would be over half of total employment in that Alternative. About 20% of total employment in Alternative N would be in the office block; there would be small amounts of office activity in businesses in the new M-2 Industrial space.

S/LI/RD uses and M-2 uses (M-2 Industrial and Port-Related/M-2) would be the other major employment categories in Mission Bay. Each of the Alternatives would have space designated S/LI/RD or M-2, representing a mix of business activities and employment different from the office sector. S/LI/RD would be an important component of

Alternative A, contributing to the diversity of business activity and employment. In Alternative B, S/LI/RD development would be on a relatively small scale. Activities under the M-2 Industrial designation in Alternative N would be somewhat different from S/LI/RD activities in Alternative A. M-2 uses would occupy almost all of the Project Area in Alternative N and account for most of the employment (over 70% of total employment in that Alternative).

Other components of Mission Bay development would represent smaller amounts of employment in the Project Area. The amount of hotel employment in Alternative A would be relatively small given the magnitude of employment in other business activities; it would add, however, to diversity of employment in that Alternative. Following from its base in residential development, Alternative B would have the most employment in resident-serving uses: retail, community facilities, and housing-related (e.g., residential building management and security personnel). In all Alternatives, building maintenance / security and parking employment would be a function of the amount of commercial and industrial space in the land use program.

HOUSING AND POPULATION: 2000 and BUILD-OUT/2020

Table V.7 presents estimates of housing units, households, population, and employed residents in the Project Area by Alternative for build-out and the year 2000. The estimates include the houseboat community in the China Basin Channel in addition to new housing for Mission Bay specified in two Alternatives. The estimates incorporate an assumption of an overall vacancy rate of about 3.5% for new housing in the Project Area.

The land use programs for the Alternatives specify a mix of housing densities, within which there would be a mix of sizes and types of units. The population estimates in Table V.7 reflect assumptions about household size (persons-per-household) for various types of units, as defined in terms of housing density (units per acre), housing size (square feet per unit), and affordability. The household size factors are used to derive population estimates from estimates of occupied housing units (households). The estimates of employed residents are based on assumptions about the age distribution of the Mission Bay population and consideration of the extent to which Mission Bay residents in their labor force years would be likely to work. (Appendix A. The EIR Alternatives, p. XIV.A.13, describes the methodology for estimating Project Area population and employed residents for the Alternatives.)

TABLE V.7: MISSION BAY HOUSEHOLDS AND POPULATION, BY ALTERNATIVE, 2000 AND BUILD-OUT/2020

	Alternative A		Alternative B		Alternative N/a/	
	2000	2020	2000	2020	2000	2020
Housing Units/b/	2,870	7,720	2,760	10,020	20	20
Households/c/	2,770	7,450	2,665	9,670	20	20
Population	5,445	14,400	5,050	18,670	36	36
Employed Residents	3,275	8,700	3,060	11,290	26	26

NOTE: The estimates include the households in the houseboat community. The houseboat community is represented as 20 households, housing 36 people, 26 of whom are employed.

/a/ In Alternative N, houseboats are the only housing in the Project Area.
/b/ The difference in housing units between Alternatives A and B in 2000 is not significant. Housing is presumed to develop at the same rate in each Alternative. The difference reflects the sequencing of development in each Alternative and the housing densities in locations that would be developed by 2000.
/c/ Households represent occupied housing units, assuming a 3.5% vacancy rate. The 20 houseboats are assumed to be fully occupied.

SOURCE: Recht Hausrath & Associates

In terms of housing and population, Alternative N is notably different from the other Alternatives in that there would be no new housing in Mission Bay./5/ The households and population in the future under Alternative N are represented by the China Basin Channel houseboat community. While Central Waterfront Plan policies would encourage such housing, the M-2 zoning and general industrial character of the area would inhibit housing development unless it were part of a large-scale, planned development (as contemplated in Alternatives A or B)./5/ See Chapter VII. Variations on Alternatives, p. VII.1, for an analysis of housing in Alternative N pursuant to the Central Waterfront Plan.

As with commercial space and employment, there would not be much difference between Alternatives A and B by 2000 because new housing is assumed to be developed at about the same pace in each, at a rate that would be feasible in terms of construction schedules and marketability. Alternative B would have a larger total amount of new housing at build-out, just under 30% of which would be developed and occupied by 2000.

In Alternative A, with a smaller total amount of housing, about 40% would be developed and occupied in 2000. In Alternative B, housing development would continue long after the relatively small amount of commercial space had been occupied. In Alternative A, with a larger amount of commercial space, development of both types of uses (residential and commercial) would proceed in tandem throughout the build-out period.

APPROVAL PROCESS

ENVIRONMENTAL REVIEW, MASTER PLAN AMENDMENTS AND REZONING

Following a public hearing before the City Planning Commission on the Draft EIR, responses to written and oral comments will be prepared. A Final EIR containing revisions as appropriate will be presented to the City Planning Commission for certification. No city approvals for the project can occur before the Final EIR is certified. The EIR process is further discussed in VI.A. Public Plans, Policies and Permits, p. VI.A.15.

The terms of city approval of any development program for the Mission Bay Project Area would be defined in a development contract or agreement. The development agreement would include conditions agreed upon by the sponsor, Santa Fe Pacific Realty Corporation, and the City specifying the physical and economic aspects of the development, a plan for the phased implementation of project construction, social programs associated with the project, and a program that allocates responsibility for infrastructure and other financial aspects of the project. A final development agreement would require approval by the City Planning Commission and Board of Supervisors, each following a public hearing / review process, and signature by the Mayor./6/ That can occur only after certification of the Final EIR.

In conjunction with approval of a development agreement, the Department of City Planning would develop a Subarea Plan or Special Area Plan for the Project Area. The Special Area Plan would amend the Central Waterfront Plan, specifically the objectives and policies for the China Basin and Central Basin subareas. It would be accompanied by Planning Code and Zoning Map amendments to implement the Special Area Plan; the amendments would include rezoning the Project Area to apply new Use and Height and Bulk Districts that would allow development of the project./7/ Those Master Plan, Planning Code and Zoning Map amendments would be subject to approval by the City

Planning Commission. Planning Code and Zoning Map amendments would then require enactment by the Board of Supervisors in the form of ordinances and would require the signature of the Mayor.

The project could qualify as a Specific Plan under the Subdivision Map Act; it would then require Tentative Map approval. New streets created by the project would be subject to city acceptance. Park lands could be accepted by the Recreation and Parks Commission as city property.

In approving any amendments to the City Master Plan, Planning Code or Zoning Map or adopting a development agreement, the Planning Commission and Board of Supervisors also would evaluate the Mission Bay project against the eight Priority Policies established by Proposition M, approved by the voters in 1986 and incorporated into the Planning Code (Section 1011). Those policies are described on p. VI.A.13. In the absence of exemption by the voters, Mission Bay office space would be subject to Proposition M limits on office space approvals.

OTHER CITY PERMITS AND APPROVAL PROCESSES

All Mission Bay Alternatives would require demolition, site, building, and fire safety permits; the project sponsor would file for the applicable permits with the Central Permit Bureau of the Department of Public Works (DPW). Under the City's Hazardous Soils Analysis Ordinance, the sponsor would be required by the Director of Public Health to submit with the building permit application a complete history of the site for which the permit was sought and soil samples analyzed for the presence of hazardous materials (see p. VI.N.2). The project also would be subject to street vacation and city land acquisition requirements of the Department of Real Estate and DPW; street vacation and land acquisition require approval by the Board of Supervisors. The Department of Public Health would issue food and beverage permits for specific businesses. The Port of San Francisco would have site, demolition, building and fire safety permit authority over lands east of Third Street within the Project Area (see Table VI.A.3, p. VI.A.68).

REGIONAL, STATE, AND FEDERAL APPROVALS

The Bay Conservation and Development Commission (BCDC) would require a permit for development within the 100-foot shoreline band for public access to the waterfront and China Basin Channel, and dredging activities in the channel for Alternative A.

Alternatives A and B would require revision to the regional Seaport Plan prepared by the Metropolitan Transportation Commission (MTC) and BCDC to remove the designation of Piers 52 to 64 as Near-Term Marine Container Terminal development sites and remove the port priority use designation from the area east of Third Street (see Seaport Plan discussion, p. VI.A.19)./8/

The Bay Area Air Quality Management District (BAAQMD) may require air quality permits for construction activities and specific uses or tenants locating in the Project Area after construction; no air quality permits are required for approval of the development agreement. Some uses or tenants may also require water quality permits from the Regional Water Quality Control Board (RWQCB).

Some of the lands within the Project Area proposed for conveyance to the project sponsor would be subject to the public trust for navigation, commerce, and fisheries under the jurisdiction of the State Lands Commission (SLC) and to the statutory trust imposed on lands granted to the Port of San Francisco under the Burton Act (Stats: 1968, ch. 1333). In addition, an exchange of lands held in trust by the Port under the Burton Act has been proposed for lands owned by the project sponsor and other private entities north of Pier 80 outside the Project Area. Such a land exchange would be necessary to allow development of the non-maritime uses proposed in Alternatives A and B on certain port lands east of Third Street. The Legislature recently amended the Burton Act to authorize the Port of San Francisco to enter into land exchanges for land of equal or greater value when certain conditions have been met. Therefore, to the extent lands held in trust by the Port are proposed to be conveyed to the project sponsor, the approval of both the SLC and the Port would be required and certain findings would have to be made by both agencies./9/

Caltrans may require encroachment permits for all Alternatives, although Alternative N would have less development in Caltrans rights-of-way than would the other two Alternatives. Caltrans is the lead agency for removing the I-280 freeway stub in the Project Area from Third to Sixth Streets and constructing new ramps, one of the projects of the I-280 Transfer Concept Program (see VI.E. Transportation, p. VI.E.60). Caltrans would review proposals for configuration of the new ramps on King Street./10/ The California Public Utilities Commission (CPUC) has stated that relocating the CalTrain commute station from Fourth and Townsend Streets to Seventh and Channel in Alternatives A and B would require its approval, as would changes proposed in Alternatives A and B to the existing freight rail network in the Project Area and vicinity.

The Department of Fish and Game may require a Stream Alteration Agreement for any reconfiguration of the channel under Alternative A. Under Alternatives A and B, the U.S. Coast Guard would require a Bridge Permit for new bridge construction over the channel at Owens Street. The U.S. Army Corp of Engineers would require a Section 404 and Section 10 Permit for dredging activities and channel alteration under Alternative A; that permit would be reviewed by the RWQCB. All of those permits are discussed further beginning on p. VI.A.44 and summarized in Table VI.A.4, p. VI.A.69.

NOTES - The EIR Alternatives and Approval Process

/1/ Parking ratios for the uses in each Alternative are given in Table VI.E.25, p. VI.E.160.

/2/ For purposes of analysis for urban design, the configuration of the housing types is assumed generally to be similar to the following prototypes in "Housing Mix/Finance/Building Prototypes, Part II," special study for Mission Bay, September 1986, pp. 3 and 4. These prototypes do not represent all housing types possible.

Type	Density for EIR	Special Study Prototypes
Low (LDR)	Up to 50 units/acre	IIIB and IVA
Medium (MDR)	Up to 85 units/acre	IVD and IVE IVC and VA (over retail)
Medium-High (MHDR)	Up to 120 units/acre	VIIIA
High (HDR)	Up to 150 units/acre	VIIIB

/3/ The Peninsula Commute Service, known as CalTrain, provides daily commuter transit service between San Francisco and San Jose. The service is operated by the Southern Pacific Transportation Company under contract to the California Department of Transportation (Caltrans). Currently, the San Francisco terminal is used for storage of spare cars, maintenance and repair of passenger coaches, and storage of spare parts. Heavy maintenance and major overhaul of coaches and diesel locomotives is performed at Southern Pacific facilities in Oakland and Roseville.

Independent of the Mission Bay Project, Caltrans has identified shortcomings and inefficiencies in the present CalTrain maintenance operations resulting from inadequate facilities in San Francisco and dispersal of maintenance operations in several locations. Because CalTrain has purchased new passenger coaches and diesel locomotives, improved maintenance facilities are under consideration. To rectify the existing situation, Caltrans has proposed the construction of a new whole-train progressive maintenance facility, which would be used for cleaning, inspection, and repair of rolling stock.

Caltrans has examined a number of potential locations for the maintenance facility, including the area adjacent to the terminal at Fourth and Townsend Streets. However, that site (along with many other possible alternatives) was rejected by Caltrans because it was restricted in size, not compatible for joint use by MUNI, was too costly, and not for sale (Caltrans cannot condemn land for rail projects). Caltrans is considering five potential sites for the maintenance facility: the Bayshore yard in Brisbane, the Newhall Street Yard in Santa Clara, the Lick Quarry in unincorporated Santa Clara County and a site at South Gilroy. An Initial Study for the five sites, published in May 1988 identifies preferred and alternate sites. The siting of the facility at those two sites will be the subject of an EIR/EIS to be prepared in late 1988. It is expected that selection of a site, environmental review, engineering design and construction will take about five years. Thus, by 1992 the San Francisco maintenance facilities may be closed and those activities moved to a newly constructed facility. Caltrans, Proposed Rail Maintenance Facility for Peninsula Commute Service, Project Description, September 1987.

/4/ Within the Project Area, commercial and residential development are assumed to occur in tandem, i.e., housing is built as commercial space is built. That coordination of uses is most relevant to Alternative A, because it has the greatest mix of uses. It does not apply in Alternative N, because there is no new residential development. Since Alternative B is largely residential, the commercial development is phased to illustrate a reasonable scenario given the sites designated for those uses.

/5/ Although the Central Waterfront Plan encourages housing development in the China Basin Area, housing would be a conditional use under the existing M-2 zoning. For Alternative N, with no rezoning or coordinated development efforts in the area, it was assumed that large amounts of housing would not be likely to be proposed. Commercial and industrial development would be more likely to predominate and thus, the area would not be as attractive for potential residential development. Moreover, without large-scale residential development, including substantial amenities and other design features, there would not be many people who would choose to live in the China Basin Area.

/6/ The development agreement would have to be consistent with the City's enabling ordinance, Board of Supervisors File No.97-87-78.

/7/ Elements of the San Francisco Master Plan would be reviewed for conformity; the Department of City Planning would prepare any other necessary Master Plan amendments.

/8/ Piers 70 to 80 south of the Project Area, the only available replacement sites, could be designated as Near-Term Container Terminal sites.

/9/ For an exchange of lands to take place under this legislation (Stats: 1987, ch. 310), both the Port and State Lands Commission must find that the lands to be exchanged:

- have been filled or reclaimed;
- are cut off from access to the waters of San Francisco Bay;
- constitute a relatively small portion of the tide and submerged lands granted to the Port; and

- are no longer needed or required for the promotion of the public trust for commerce, navigation and fisheries or the statutory trust.

Both agencies also must further find that no substantial interference with trust uses and purposes will ensue.

To the extent other lands subject to the public trust but not held in trust by the Port are proposed to be conveyed to the project sponsor, a land exchange under Section 6307 of the Public Resources Code or separate legislation requiring similar findings by the State Lands Commission would be required.

/10/ Caltrans would work with the City, MTC, the California Transportation Commission, Federal Highway Administration and Mission Bay project sponsor to resolve what private funds, I-280 TCP funds and other public funds would be devoted to demolition of the stub and construction of new ramps.

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION

A. PUBLIC PLANS, POLICIES, AND PERMITS

SETTING

The Public Plans, Policies and Permits Setting describes the relevant City of San Francisco, regional agency, state, and federal plans and policies relevant to development of Mission Bay. City Master Plan policies, for example, would affect overall Project Area development, while other agencies would have permit jurisdiction over specific aspects of certain Alternatives. Many of those permit activities would occur only after city approval of an overall Mission Bay plan, as part of review of specific development proposals.

This Setting is followed by Comparison with Alternatives, which presents the implications of the Alternatives for those plans policies, and permit jurisdictions.

LOCAL AGENCIES

City and County of San Francisco

The San Francisco Master Plan

The San Francisco Master Plan (hereinafter "Master Plan"), adopted by the City Planning Commission, is the comprehensive, long-term general plan containing the land use policy for San Francisco, as required by California law, Title 7, Planning and Land Use, Section 65300. The Master Plan includes the following Elements: Land Use; Commerce and Industry; Residence; Transportation; Urban Design; Recreation and Open Space; Community Facilities; Environmental Protection; and Energy. State guidelines also permit cities to adopt area plans to allow specific local application of jurisdiction-wide policies. The Master Plan includes a number of area plans. The Central Waterfront Plan is the area plan that includes the Mission Bay Project Area, which would be subject to amendment during review of any proposals for new development in Mission Bay. In addition, other Master Plan Elements, described beginning on p. VI.A.10, also may require amendments before aspects of the Mission Bay development could be implemented.

Central Waterfront Plan

The Central Waterfront Plan, adopted in July 1980 as part of the Master Plan, is intended to fulfill a goal of the Commerce and Industry Element calling for diversification of San Francisco's economic base and improvement of industrial and maritime sectors./1/ The plan includes six geographic subareas: Showplace Square, North Potrero Hill, China Basin, Central Basin, Islais Creek, and Lower Potrero Hill. The boundaries of the China Basin subarea and the northern half of the Central Basin subarea are roughly the same as those of the Mission Bay Project Area (see Figure VI.A.1).

The overall goal of the Central Waterfront Plan is "to create a physical and economic environment conducive to the retention and expansion of San Francisco's industrial and maritime activities, to reverse the pattern of economic decline in the area and to establish a land base for the industrial and maritime components of the San Francisco economy." The plan's objectives and policies are designed to (1) "increase employment opportunities for San Francisco's unemployed and underemployed residents, (2) enhance the working environment to stimulate business growth and (3) improve the area's appearance and attractiveness."

The following outlines the general objectives and policies of the Central Waterfront Plan:

- Land Use: Preserve and promote the Central Waterfront area for San Francisco's industrial activities while developing residential, commercial and recreational uses on surplus land that complement industrial and maritime activities.

- Industry: Retain, expand and protect industrial activity by rehabilitating old structures, developing vacant land, consolidating rail operations, establishing job training, financing programs for new development, and removing overly restrictive city codes related to industry.

- Maritime: Retain and expand existing maritime activities; encourage development of container terminals along the waterfront; and reserve land adjacent to the waterfront for maritime support use.

- Commerce: Provide commercial and water-oriented recreational activities to serve the area's residents and businesses while preventing office development that is not directly related to industrial and maritime activities.

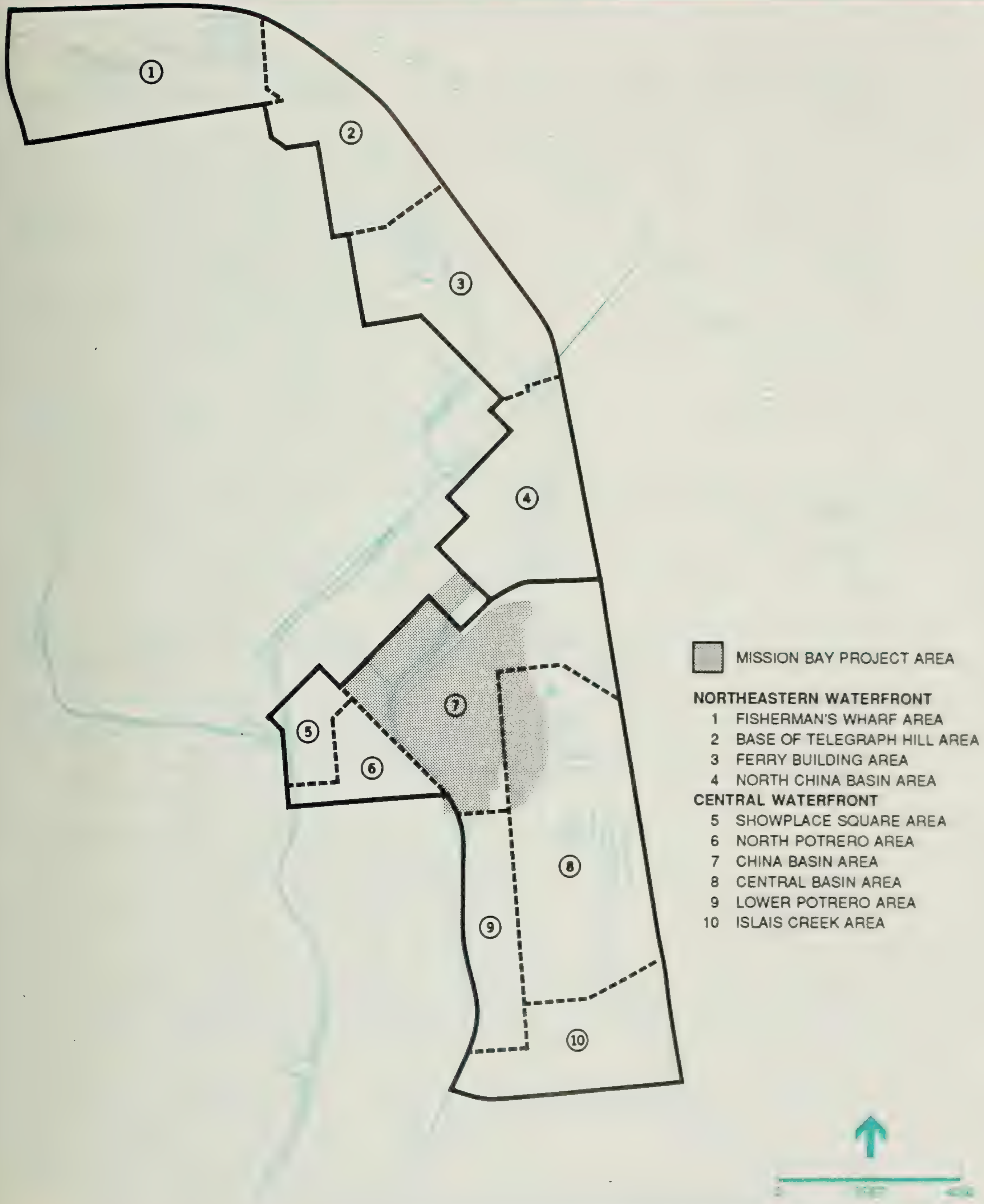

①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
▨ MISSION BAY PROJECT AREA
NORTHEASTERN WATERFRONT
1 FISHERMAN'S WHARF AREA
2 BASE OF TELEGRAPH HILL AREA
3 FERRY BUILDING AREA
4 NORTH CHINA BASIN AREA
CENTRAL WATERFRONT
5 SHOWPLACE SQUARE AREA
6 NORTH POTRERO AREA
7 CHINA BASIN AREA
8 CENTRAL BASIN AREA
9 LOWER POTRERO AREA
10 ISLAIS CREEK AREA

FIGURE VI.A.1
CENTRAL WATERFRONT PLAN AND
NORTHEASTERN WATERFRONT PLAN AREAS

SOURCE: S.F. Department of City Planning

- Residence: Retain existing housing and residents; promote new housing in established residential areas and near China Basin Channel, including development of low- and moderate-income units.

- Transportation: Improve citywide and regional auto, truck and pedestrian access to the Central Waterfront, including extending light-rail service to the area.

- Recreation and Open Space: Provide public access to the waterfront and recreational resources in the area, compatible with industrial and maritime activities.

- Urban Design: Design new development to be compatible with existing topography, limit height and bulk along the waterfront, and protect and create views of downtown and the Bay.

Specific objectives and policies for the China Basin subarea include the following:

- Objective 1: Expanding maritime activity in the China Basin area, expanding and continuing the use of Piers 48 and 50 for general cargo, and adding a general cargo facility at Pier 62.

- Objective 2: Providing public access to the waterfront, developing a new waterfront recreation area along both sides of China Basin Channel.

- Objective 3: Specifically referring to the Project Area, "Develop a mix of new uses on surplus rail property in the China Basin area." Policies to implement Objective 3 are "(1) identify land [that is] surplus to the operating needs of the railroads and the Port. Encourage the consolidation of rail operations, either internally or jointly, as a means of releasing land for alternative uses, and (2) consistent with the operating needs of the railroads, develop a mixed-use neighborhood with predominantly residential uses in the area south of the China Basin Channel and west of Third Street. Include compatible commercial and light industrial uses."

- Objective 4: Relate the scale of new development to San Francisco's distinctive hill form, the adjacent waterfront, and existing development.

Objectives for the Central Basin subarea are as follows:

- Objective 1: Expand maritime activity by reserving the water area, piers, seawall lots and 60 acres of backland for development of a container facility and by retention and promotion of ship repair and maintenance and general cargo activities./2/

- Objective 2: Retain and expand industrial uses by encouraging more intensive use of existing industrial land and facilities.

- Objective 3: Improve and expand the waterfront recreation areas at Warm Water Cove and Central Basin. Implementation policies for the latter objective include continuing the use of the public boat ramp south of Pier 50 and expanding the existing recreation area at Central Basin with a public beach, waterfront park and small-boat marina.

Other Subareas. Other subareas of the Central Waterfront Plan adjacent to Mission Bay are the North Potrero and Showplace Square subareas to the west and the Lower Potrero and Islais Creek subareas to the south (see Figure VI.A.1, p.VI.A.3).

The North Potrero subarea adjoins the Project Area along Seventh Street; objectives and policies for this subarea focus on improving and strengthening the industrial character of the area. Policy 1 calls for rehabilitation and more intensive use of existing facilities.

The two main objectives for the Showplace Square subarea are (1) to develop a major Design Center in the area; and (2) to enhance pedestrian circulation and the movements of goods to and from the area.

The Lower Potrero subarea adjoins the Project Area on Mariposa Street and extends south to Army Street. Policies for it focus on (1) retaining and expanding industrial uses; and (2) preserving and improving the existing residential neighborhood.

The Islais Creek subarea covers Pier 80 and the area inland from the pier to the I-280 freeway. Policies for this subarea are consistent with current capital improvement plans of the Port of San Francisco (see p. VI.A.20) and focus on (1) expanding maritime activity by modernizing Pier 80 for general cargo handling; (2) retaining and expanding industrial uses; and (3) developing recreational uses along the Islais Creek channel.

Adopted Plans Affecting Nearby Areas

Northeastern Waterfront Plan. The Northeastern Waterfront Plan, adopted as part of the Master Plan in December 1980, complements the Central Waterfront Plan in that it provides planning objectives and policies for the northern half of San Francisco's waterfront. These two plans when considered together provide master plan guidance for the entire San Francisco Bay waterfront./3/ The policies for the northern waterfront call for the development of other than industrial/maritime uses with the assumption that industrial/maritime uses will be encouraged in the Central Waterfront area. In this context, the policies of the Northeastern Waterfront Plan are relevant to the Mission Bay project.

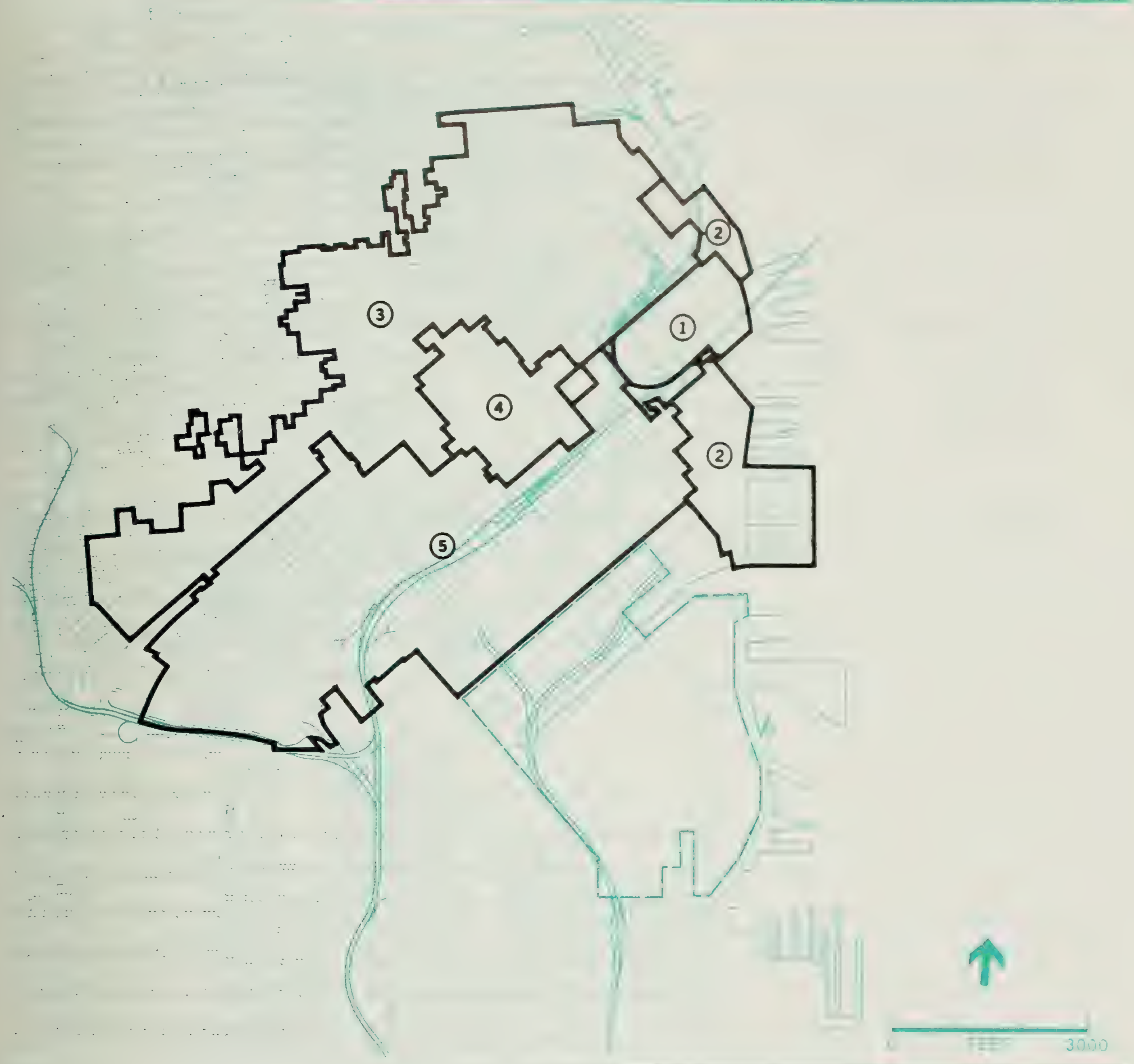
The plan encompasses the waterfront area from Aquatic Park south to the China Basin Channel entrance (see Figure VI.A.1, p. VI.A.3), and includes four subareas: Fisherman's

Wharf, the Base of Telegraph Hill, the Ferry Building, and the North China Basin; the Embarcadero Corridor runs the length of The Embarcadero roadway along the Bay shoreline. The North China Basin subarea (Piers 26 through 46) is directly north of the Mission Bay Project Area.

The plan's land use and transportation goals include maintaining shipping and related maritime uses in areas where piers are sound. On lands no longer needed for maritime purposes, the predominant uses should be open space and water-oriented public recreation; inland areas could be for residential and office uses. The plan also calls for a new landscaped design and rail mass transit for The Embarcadero, linking the Northeastern Waterfront with other portions of the shoreline. (See p. VI.A.24, for a discussion of the current status of improvements to the Embarcadero.) Objectives and policies for the North China Basin subarea include: continuing Piers 26-38 in break-bulk cargo handling south of the Bay Bridge; and removing Piers 42-46A and a portion of Pier 40 to develop a small-boat marina (completed) and waterfront park as part of the Rincon Point - South Beach Redevelopment Plan (see below).

Rincon Hill Plan. The Rincon Hill Plan, adopted as part of the Master Plan in July 1985, covers a 12-block area northeast of Mission Bay and east of the area covered by the proposed South of Market Plan (see Figure VI.A.2)./4/ The Rincon Hill Plan contains policies to create a residential neighborhood close to downtown that would increase the City's housing supply, and induce private investment to transform the area into a new residential neighborhood, without public acquisition of land. The plan proposes mixed-use development to include housing, recreation, services, retail businesses, offices and light-industrial uses. Office and light-industrial uses would provide daytime support for the goods and services that new housing would require, and would buffer new housing from the Bay Bridge and freeways. Main, Beale and Spear Streets would be reduced in width to establish a more residential scale, and an interior circulation and open space system would be provided to enhance the area's residential character and link Rincon Hill to the Bay.

The Rincon Point - South Beach Redevelopment Plan. The redevelopment plan for the Rincon Point - South Beach Redevelopment Areas, under the jurisdiction of the San Francisco Redevelopment Agency (SFRA), was adopted in 1981 and 1984./5/ The Rincon Point Redevelopment Area extends roughly from Mission Street to Harrison Street along the waterfront; the South Beach Redevelopment Area extends from Bryant Street to the entrance of the China Basin Channel (see Figure VI.A.2).



– – – – – – – – – – MISSION BAY BOUNDARY

Plans Affecting Nearby Areas

① RINCON HILL PLAN

② RINCON POINT - SOUTH BEACH REDEVELOPMENT PLAN

③ DOWNTOWN PLAN*

④ YERBA BUENA CENTER REDEVELOPMENT PLAN

Proposals for Citizen Review Affecting Nearby Areas

⑤ SOUTH OF MARKET PLAN

*NOTE: These are current C-3 District boundaries adopted in 1985 and not the former C-3 area analyzed in the Downtown Plan EIR.

Mission Bay

SOURCE: Environmental Science Associates, Inc. and S.F. Department of City Planning

FIGURE VI.A.2
AREA PLANS AND PROPOSALS FOR CITIZEN REVIEW AFFECTING NEARBY AREAS

The main objectives of the redevelopment plan are to: (1) remove substandard buildings to order to encourage new private development of mixed-income housing and hotel and commercial employment opportunities; (2) create two new waterfront parks, including a small-boat marina, both of which would complement open space opportunities in the Rincon Hill Plan area; (3) re-route and improve The Embarcadero.

The small-boat marina north of Mission Bay was completed in 1986. Housing density in the Rincon Point area will be developed at 150 to 300 units per acre, and 85 to 95 units per acre in the South Beach area. The plan also calls for neighborhood-serving commercial uses.

Yerba Buena Center Redevelopment Plan. Yerba Buena Center, roughly a six-block area along Third and Fourth Streets, is also a San Francisco Redevelopment Agency project./6/ The plan includes hotels, entertainment/cultural uses, housing, office, retail, institutional uses and the completed Moscone Convention Center. In November 1986, voters approved an initiative to expand the convention center into the adjacent block north of Howard Street.

Downtown Plan. The Downtown Plan was adopted as part of the Master Plan on October 17, 1985 ./7/ The area regulated by the Downtown Plan generally encompasses the area considered the financial, retail, and downtown services (C-3) districts and is located about one mile northeast of the Mission Bay Project Area. The Downtown Plan is a set of growth management, land use and zoning controls for the C-3 districts. Implementing actions include regulation of floor area ratios (FAR), height and bulk limits, use districts, architectural and historic preservation, and additional provisions concerning recreation and open space, child care facilities, urban design provisions, and transportation and circulation measures.

The overall objective of the Downtown Plan is to control and direct development downtown and to redirect the amount of future office development. It also provides that no other cluster of office space should be allowed to develop in the rest of the City that does not complement the downtown core. To allow for expansion of development, the Plan identifies a C-3-0 (SD) (Downtown Office Special Development) Use District generally located in the South of Market (see Figure VI.A.2, p. VI.A.7). The purpose of the C-3-0 (SD) District is to provide "for an orderly expansion of the financial district in a way that will maintain a compact downtown core, and to create an area in which to direct unused development potential of lots containing" architecturally or historically significant buildings (Transfer of Development Rights)./8/

South Bayshore Plan. The South Bayshore Plan, adopted in January 1970, encompasses the area bounded roughly by Islais Creek, US 101, San Francisco Bay, and the San Francisco County line./9/ The plan area includes Bayview Hill / Hunters Point, Executive Park and Candlestick Stadium. Area plan policies include improving access to the area from other parts of the city; encouraging housing conservation and development and buffering residential uses from industrial uses; and creating a shoreline park and marina near Candlestick Stadium. The plan encourages enhancing Third Street, the principal commercial street, and using the redevelopment process to accelerate the development of vacant industrial lands and to create labor-intensive employment in the district. The South Bayshore Plan was amended in 1978 and 1985 to include the Executive Park Development near Candlestick Park as a Subarea Plan to include 600 residential units, and up to 1.7 million square feet of office space, hotel/meeting, retail, and restaurant space. A planning program to revise the South Bayshore Plan is underway.

Proposals for Citizen Review Affecting Nearby Areas

South of Market Plan. The South of Market Plan, a Proposal for Citizen Review, was published in June 1985./10/ The plan area is roughly bounded by Fourth, Townsend, 13th, and Minna Streets. The plan addresses land use issues in the context of the surrounding remainder of the South of Market (e.g., Rincon Hill, Yerba Buena Center, South Beach, and the C-3 area covered by the Downtown Plan; see Figure VI.A.2, p. VI.A.7), and in the context of city-wide housing and commercial space demand and resources.

The primary goals of the plan are to protect existing economic, social and cultural diversity through the preservation of existing housing, encouragement of new affordable "in-fill" housing, and the expansion of industrial, artisan live/work, business services and community-serving retail activities. Adjacent to the Mission Bay Project Area, portions of Townsend and Second Streets are proposed as a service/secondary office district with a height limit of 65 feet.

San Francisco Master Plan Elements

Commerce and Industry Element. The Commerce and Industry Element, adopted in 1978, "sets forth objectives and policies that address the broad range of economic activities, facilities and support systems that constitute San Francisco's employment and service base."/11/ The Element's goals are continued economic vitality, social equity and environmental quality. Specific objectives concern major economic sectors including manufacturing and industry, maritime activities, office and administrative services, neighborhood commercial retailing, and visitor trade. The Element sets forth policies to retain and enhance industrial and maritime activities which the Central Waterfront Plan, discussed above, was designed to implement. Industry Policy 5 acknowledges that residential growth in mixed residential and industrial areas, such as South of Market, should not cause large-scale displacement of viable businesses, and that growth of the downtown office core should also be guided to avoid dislocation of smaller scale industries.

Residence Element. The Residence Element, adopted in its current form in 1984, provides data and information to assess housing conditions and needs in San Francisco; contains objectives and policies to deal with the identified needs and constraints; and proposes implementation programs to carry out the housing objectives and policies./12/

The Element notes that since the supply of affordable housing is not expanding rapidly enough to match demand, the City can increase that supply in several ways: assuring that sufficient sites exist for housing at locations acceptable to the public; providing various incentives to induce the production of housing; and assisting, to a limited extent, in the financing of housing. Policies also address preservation of the quantity, quality and affordability of existing housing, by discouraging demolition or conversion to other uses, encouraging maintenance and rehabilitation, continuing rent regulation, and encouraging non-profit ownership of rental housing. Housing Supply Policy 2 states: "Facilitate the conversion of underused industrial and commercial areas to residential use." The Element's inventory of land suitable for residential development includes Mission Bay as a "housing opportunity site" and estimates that 8,800 potential housing units could be built subject to detailed analysis during rezoning studies to determine appropriate housing density levels. Housing Affordability Policy 3 states: "Seek inclusion of low and moderate income units in new housing development." Housing market conditions are discussed in VI.C. Housing and Population, p. VI.C.1.

Transportation Element. The Transportation Element of the Master Plan was adopted in 1972 and last amended in 1984./13/ The Element includes the Mass Transit Plan, the Vehicle Circulation Plan, the Pedestrian Circulation Plan, the Bicycle Plan, the Downtown Transportation Plan, and the City-wide Parking Plan./14/

The Element has two general objectives: 1) "Meet the needs of all residents and visitors for safe, convenient and inexpensive travel within San Francisco and between the City and other parts of the region;" 2) "Use the transportation system as a means for guiding development." The Element identifies transit preferential streets, major and secondary thoroughfares, bikeway areas, and policies for transit and roadway improvements. The Transportation Element is further discussed in VI.E. Transportation, pp. VI.E.45 and VI.E.47.

Urban Design Element. The Urban Design Element, adopted in 1971, guides the physical character and order of the City, and the relationship between people and the environment./15/ It examines four issues: City Pattern, Conservation, Major New Development, and Neighborhood Environment. The plan's design guidelines encompassing height, bulk, building form, view corridors, and streetscape measures are used by the Department of City Planning to review major projects. The Urban Design Element is further discussed in VI.I. Architectural Resources and Urban Design, pp. VI.I.18-VI.I.23.

Recreation and Open Space Element. The Recreation and Open Space Element, adopted in 1973 and amended in July 1987, identifies "objectives and policies to meet San Francisco's needs for recreation and open space at regional, city-wide and neighborhood levels."/16/ The element includes land use policies, open space requirements, public access, and urban design measures for new development in the San Francisco shoreline zone. The shoreline zone "covers the City's entire shoreline but varies in the degree to which it extends inland, depending on the quantity of the existing open space and public recreation facilities in the area and on the amount of new development anticipated." The Eastern Shoreline Plan map identifies the eastern edge of Mission Bay and the shoreline of China Basin Channel as areas in this zone.

The Element notes that a plan for the Mission Bay area is being prepared which may require further revisions to recreation and open space policies. The Element is further discussed in VI.D. Community Services and Infrastructure, Recreation and Parks, pp. VI.D.86-VI.D.91.

Community Facilities Element. The Community Facilities Element includes the Plan for Neighborhood Center Facilities, adopted in 1977./17/ The plan consists of objectives, policies and criteria for the distribution, location, design, use, and administration of City-owned, multi-purpose neighborhood centers to address the cultural, social and recreational needs of neighborhood residents. Programs would vary according to the composition and needs of the local population, but could include child care, health care, youth activities, senior citizen services, adult education, counseling and arts programs. The plan refers to a 1975 report which identifies the South of Market and Potrero Hill neighborhoods adjacent to Mission Bay as lacking such facilities.

The Police Facilities Plan, adopted in 1974, is the second component of the Community Facilities Element and addresses San Francisco's long-range police facility requirements./18/ Police facilities that serve Mission Bay are discussed in VI.D. Community Services and Infrastructure, Police Protection, beginning on p. VI.D.6.

Environmental Protection Element. The Environmental Protection Element includes the Plan for Conservation, adopted in 1973, and the Plan for Transportation Noise Control, adopted in 1974./19,20/ The objective of the Conservation Plan is to "achieve a proper balance among the conservation, utilization and development of San Francisco's natural resources" -- the Bay, ocean and shorelines, air quality, fresh water, land, and flora and fauna. The Plan for Transportation Noise Control is directed toward reducing transportation-related noise from vehicles to minimize the impact of noise on affected areas, and promote land uses that are compatible with various transportation noise levels. The Transportation Noise Control Plan is discussed further in VI.G. Noise, p. VI.G.8.

Energy Element. The Energy Element, adopted as a component of the Environmental Protection Element in 1982, includes goals to increase the efficiency with which energy is used; diversify the balance of resource supplies to meet energy needs; foster the economic development of energy management services and renewable energy systems; and encourage the participation of community members to carry out city energy programs./21/ The Energy Element is discussed in VI.H. Energy, pp. VI.H.5-VI.H.6.

Community Safety Element. The Community Safety Element, adopted in 1974, provides "for inclusion of geologic and fire hazard concerns in the planning-development process" and "establishing ways to reduce the risk to San Franciscans from geologic and fire hazards."/22/ The Element summarizes geologic and structural investigations, and objectives and policies to protect life, preserve the architectural character of buildings, prepare emergency operations, and assure sound reconstruction following a major disaster. Fire safety concerns are further discussed in VI.D. Community Services and Infrastructure, Fire Protection, which begins on p. VI.D.1. Potential seismic hazards of the site are described in VI.K. Geology and Seismicity, beginning on p. VI.K.33.

Project Review and Approvals

San Francisco City Planning Code and Zoning Map. The City Planning Code, Chapter 11 of the Municipal Code, is the primary legal mechanism for guiding growth and development in accordance with the Master Plan. The City Planning Code includes text regulating land uses and location, building size, bulk, dimensions, siting, access and parking, and maps of Zoning Districts. Section 235 of the Planning Code permits establishment of Special Use Districts establishing tailored zoning regulation for areas that have unique land use conditions to be maintained or encouraged. Planning Code and Zoning Map amendments, including any new Special Use Districts, are prepared by Department of City Planning staff for public review, revision and approval by the City Planning Commission, and final approval by the Board of Supervisors and Mayor.

In November 1986, the voters of San Francisco approved Proposition M, the Accountable Planning Initiation, which establishes eight Priority Policies contained in Section 101.1 of the Planning Code. These policies are: preservation and enhancement of neighborhood-serving retail uses; protection of neighborhood character; preservation and enhancement of affordable housing; discouragement of commuter automobiles; protection of industrial and service land uses from commercial office development and enhancement of resident employment and business ownership; earthquake preparedness; landmark and historic building preservation; and protection of open space. Prior to issuing a permit for any project which requires an Initial Study under CEQA, or adopting any zoning ordinance or development agreement, the City is required to find that the proposed project or legislation is consistent with the Priority Policies.

Proposition M also established an annual limit on new office development at a rate of 950,000 square feet per year./23/ Office development in the Mission Bay Project Area would thus have to compete with other office proposals in the city for approval.

Alternatively, Proposition M contains a provision that allows voter approval to exempt office space authorized by development agreements from the annual limit. That option would enable Mission Bay office development to proceed without competing with other proposals for space allocated under Proposition M (see VI.B. Land Use, Business Activity, and Employment, p. VI.B.27 for further discussion of the annual growth limit).

The majority of the Mission Bay Project Area is within an M-2 (Heavy Industrial) District (see Appendix A. Figure XIV.A.5, p. XIV.A.8, for a map of existing Project Area zoning districts). City Planning Code Section 210.6 defines M-2 Districts as "the least restricted as to use and are located at the eastern edge of the City, separated from residential and commercial areas. The heavier industries are permitted, with fewer requirements as to screening and enclosure than in M-1 (Light Industrial) Districts, but many of these uses are permitted only as conditional uses or at a considerable distance from Residential Districts." Residential uses and certain institutional uses are conditional uses in M-2 Districts; other retail, service, wholesale, office and manufacturing activities are permitted uses.

The China Basin Channel, the approximately 100-foot right-of-way to the south of the channel and a small triangle at the southeast corner of the Project Area (Assessor's Block 3941) are zoned P (Public). State and federal governmental structures and uses are permitted in P Districts but are not subject to the City Planning Code; governmental uses of the City and County of San Francisco are allowed in P Districts as long as they comply with the City's Master Plan. The block bounded by Townsend, King, Third and Fourth Streets at the northernmost corner of the Project Area is zoned C-M (Heavy Commercial); uses allowed in this district include office, wholesaling and business services and some light manufacturing, depending on the proximity of the C-M district to residential and other commercial areas.

Height and Bulk Districts. The Project Area is within six different Height and Bulk Districts, under the existing Planning Code. Appendix A. Figure XIV.A.6, p. XIV.A.9, shows the boundaries of those districts. Except for Block 3795, the area north of China Basin Channel is located in 50-X and 40-X Districts in which the maximum permitted heights are 50 feet and 40 feet, respectively. The Townsend-Third-King-Fourth block, at the northernmost corner of the Project Area, is in a 105-F District. Generally, west of Third Street up to Sixth Street are 200-E and 130-B Districts, with maximum heights of 200 and 130 feet, respectively.

Environmental Review Process. The City and County of San Francisco is the Lead Agency for environmental review of the Mission Bay Plan and any implementing actions. The Lead Agency prepares the project Environmental Impact Report (EIR). Responsible agencies, such as the regional or state agencies discussed beginning on p. VI.A.20, have permit or approval authority for limited or specific aspects of a project and participate in the EIR preparation process through consultation with the Lead Agency, and comment on the content of the Draft EIR (DEIR) during the public review period./24/

Following publication of a Draft EIR, the Department of City Planning receives written comments. The City Planning Commission calendars the Draft EIR for public hearing(s) to receive oral comments. At the end of the Draft EIR review period, the Department prepares and publishes a Draft Summary of Comments and Responses, revising the EIR as appropriate and presenting it to the City Planning Commission for certification. The certification of the EIR as an adequate, accurate and objective disclosure of the potential significant adverse environmental effects of the project must precede any consideration of permits or other project approvals by the City or other public agencies. As a program EIR, the analyses in this document will allow decision-makers to make informed decisions on a Mission Bay development program. The analyses may also be incorporated in later environmental evaluations of development that implements the overall plan. (See Chapter V. The EIR Alternatives and Approval Process, pp. V.40-V.41.)

Other City Agency Review and Approvals. The City and County of San Francisco is the primary permitting authority for the Mission Bay project. In addition to the Master Plan, Environmental Review and Planning Code and Zoning Map amendment process described above, Table VI.A.3, p. VI.A.67 summarizes other city agencies and their permit authority. The Mission Bay project, once under construction (if approved), would require a number of city permits from agencies such as the Department of Public Health, Police and Fire Departments and the Department of Public Works and its Bureau of Building Inspection. Without specific construction plans, the types of ministerial permits required for Mission Bay cannot be determined; therefore Table VI.A.3 outlines the range of permits and approval processes required for project approval. The Permits subsection (see p. VI.A.65-VI.A.71) describes in greater depth city, regional, state, and federal permit requirements to which Mission Bay would be subject.

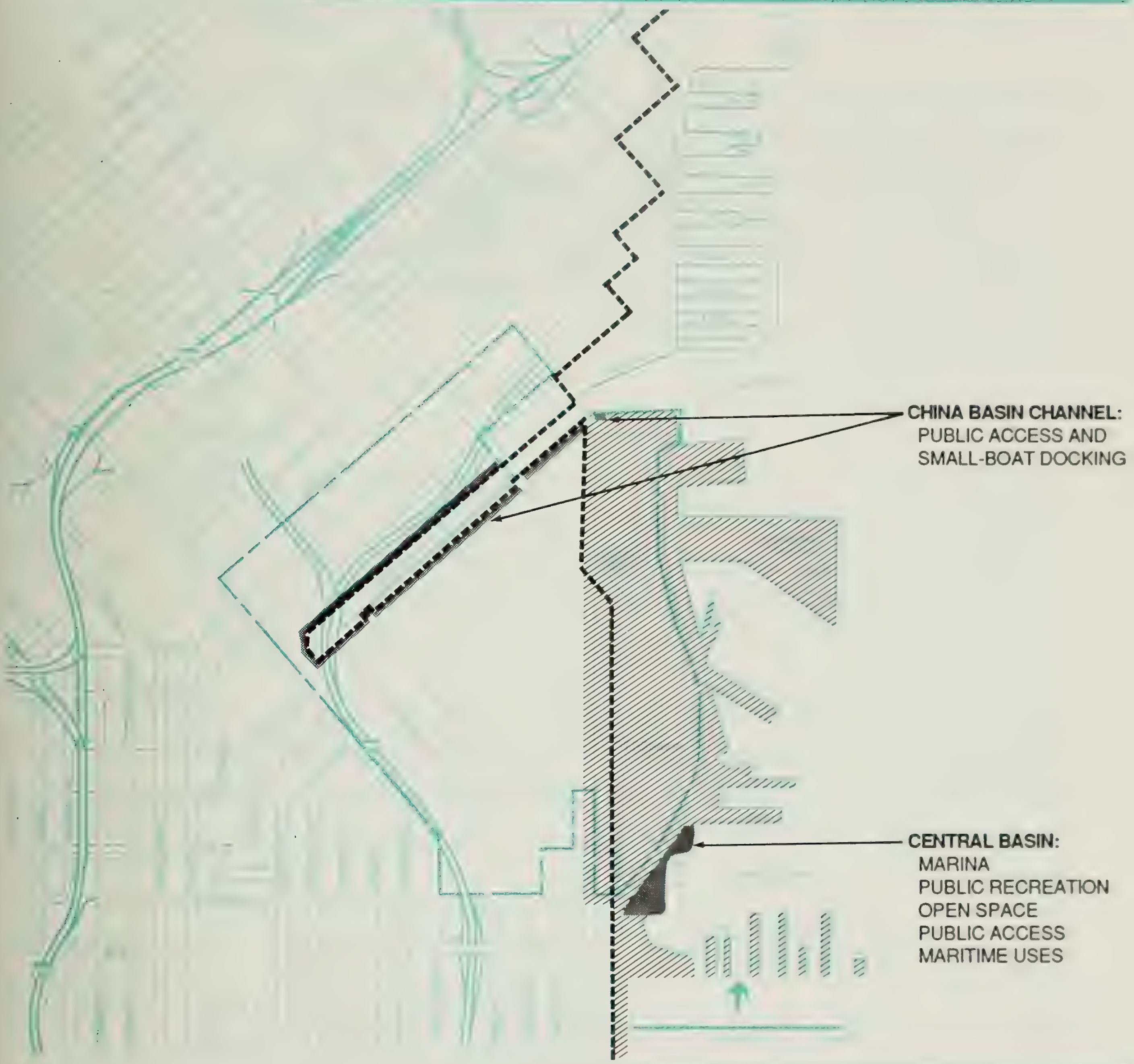
The San Francisco Fire Code, Public Works Code, and Health Code contain provisions related to identification storage and removal of hazardous materials (see VI.N. Hazardous

Wastes, beginning on p. VI.N.21 for further discussion of hazardous materials in Mission Bay. In particular, Article 29 of the Fire Code contains provisions regarding the permitting of underground storage tanks. Also, Article 20 of the Public Works Code requires preparation of a site history and an analysis of on-site soils for building permits for properties in designated portions of the City, including the Project Area. Both ordinances are described in more detail in VI.N. Hazardous Wastes, p. VI.N.1.

Development Agreement. In addition to adoption of amendments to the Master Plan, Planning Code and Zoning Map, it is anticipated that the terms of City approval of any development program for Mission Bay would be contained in a development agreement. The development agreement would be a product of negotiations between the sponsor, Santa Fe Pacific Realty Corporation, and the City specifying the physical, social, and economic aspects of development in Mission Bay. It would also include a construction phasing schedule to provide an orderly process for implementing the development plan and a plan for financing the project's infrastructure. A final development agreement would require approval by the Planning Commission and Board of Supervisors following the public hearing/review process, and be signed by the Mayor.

Port of San Francisco

In 1968, the Burton Act and accompanying Transfer Agreement, transferred the administration and control of all port property from the San Francisco Port Authority, a state agency, to the Port Commission (previously named the State Harbor Commission) of the City and County of San Francisco, to be held in trust for the people of California and, thus, administered separately from other city property. Most of this property is still owned by the state, under the jurisdiction of the State Lands Commission (SLC) (see p. VI.A.31). Under the Act, the Port of San Francisco has power to manage, operate and administer port lands, consistent with public trust restrictions established by the SLC, the City Charter, the Transfer Agreement, and local and regional waterfront plans. A relatively autonomous City agency, the Port still works closely with the Department of City Planning, other City agencies and the Mayor's office. The Port's property includes approximately 7.5 linear miles of waterfront and adjacent seawall lots. Portions of the Port's property in the Mission Bay Project Area are included in the San Francisco Bay Conservation and Development Commission's (BCDC) Port Priority Use Area, as designated in its San Francisco Special Area Plan No. 1. BCDC jurisdiction and policies are discussed further on p. VI.A.20-VI.A.23 (see Figure VI.A.3).


CHINA BASIN CHANNEL:
PUBLIC ACCESS AND
SMALL-BOAT DOCKING
CENTRAL BASIN:
MARINA
PUBLIC RECREATION
OPEN SPACE
PUBLIC ACCESS
MARITIME USES

— — — MISSION BAY BOUNDARY

- - - - PORT OF SAN FRANCISCO JURISDICTION

▨ BCDC PORT PRIORITY AREA

▩ BCDC PUBLIC RECREATION & ACCESS AREA

Mission Bay

SOURCE: Environmental Science Associates, Inc.
and S.F. Bay Conservation and Development Commission

FIGURE VI.A.3
PORT JURISDICTION AND BCDC
SAN FRANCISCO SPECIAL AREA PLAN

Port plans, policies and objectives are embodied in several documents: Conceptual Maritime Master Planning for the Southern Waterfront, the Seaport Plan (described in the following), and the Central and Northeastern Waterfront Plans of the City's Master Plan (see discussion beginning on p. VI.A.2)./25/ The Port's two planning areas, the Northern and Southern Waterfronts, are divided by Market Street; the channel is the boundary of the Central Waterfront and Northeastern Waterfront planning areas of the San Francisco Master Plan.

Conceptual Maritime Master Plan

Conceptual Maritime Master Planning for the Southern Waterfront, published in 1981, is the Port's plan for the area from China Basin Channel to Pier 96./26,27/ The plan is a series of conceptual maps and drawings rather than text, which outline alternative container facility expansion plans for Piers 48 to 64 (also referred to as the proposed Mission Rock Container Terminal) and 88 to 98 in the Southern Waterfront. The plan provides for maintenance of the Port's share of container cargo throughput for the region, consistent with the Metropolitan Transportation Commission (MTC)/BCDC Seaport Plan, and improvement of rail service to the Southern Waterfront. See VI.B Land Use, Business Activity, and Employment, pp. VI.B.9–VI.B.11, for a discussion of port facilities and uses of port property near Mission Bay.

San Francisco Bay Area Seaport Plan

The Seaport Plan, adopted in 1982, focuses on marine terminals of the six ports in the San Francisco Bay Area./28/ The Seaport Plan is a cooperative effort of the MTC and the BCDC that responds to a state law requiring a maritime element for MTC's Regional Transportation Plan (see p. VI.A.23), and a regional port development plan for BCDC's Bay Plan (see p. VI.A.21). The purpose of the plan is to provide MTC with policies for reviewing draft environmental assessments and funding applications, and to provide BCDC with policies for reviewing permit applications, draft environmental assessments and federal actions affecting the Bay. The plan calls for city and county governments to institute land use protection for land adjacent to ports, and to achieve the following goals:

- Ensure the continuation of the San Francisco Bay Port system as a major world port and contributor to the economic vitality of the San Francisco Bay Region.

- Maintain or improve the environmental quality of San Francisco Bay and its environs.

- Provide for the efficient use of finite physical and fiscal resources in developing and operating marine terminals.

- Provide for integrated and improved surface transportation facilities between San Francisco Bay Ports and terminals and other regional transportation systems.

The Seaport Plan focuses primarily on marine terminals, which include San Francisco, where the transfer of cargo is the primary activity of business entities operating on-shore. Seaport Plan policies identify future terminal sites based on projected growth in waterborne cargo for the San Francisco Bay Area and the estimated capacity of existing Bay Area marine terminals. The plan also outlines necessary improvements to channels, roads and rail systems serving port areas and discourages any local, state and federal actions that would impede access to the marine terminal sites identified. A Seaport Plan revision is expected to be completed in late 1988.

The area east of Third Street between China Basin Channel and Islais Creek is identified in the BCDC's Special Area Plan (see p. VI.A.22) as a Port Priority Use Area./29/ Within the Port Priority Area, the Seaport Plan identifies Piers 48 and 50 (Mission Rock Terminal) as Active Terminal Sites (existing marine terminal facilities that are expected to remain active for the foreseeable future), and Piers 52 to 64 adjacent to the Mission Bay Project Area as Near-Term Development Sites (a shoreline site best suited for marine terminal development). These piers together represent an area where a future container terminal could be built. The Port Priority Use Area includes land east of Third Street, generally coinciding with Port jurisdiction area (which does not include those blocks fronting Third Street, south of Fourth Street) (see Figure VI.A.3, p. VI.A.17). South of the Mission Bay site, Piers 70, 80, 86, 90, 92, 94 and 96 (to India Basin) are Active Terminals; Pier 70, the former Western Pacific rail yard, and the south side entrance of Islais Creek between Piers 92 and 96 are Near-Term Development Sites./30/

Any changes in the status of marine terminal development (i.e., the designated Near-Term sites) would require an amendment to the Seaport Plan. In addition, any residential, commercial or office use unrelated to maritime activities within BCDC permit jurisdiction would require action by BCDC (see p. VI.A.21)./31/ BCDC's San Francisco Bay Plan and San Francisco Waterfront Special Area Plan also address maritime activities, and are further discussed on pp. VI.A.21-VI.A.23.

Current Capital Improvement Programs

Port of San Francisco container cargo handling facilities are located at Piers 80 and 94 to 96 immediately north and south of Islais Creek./32/ As described in the San Francisco Container Terminal Modernization Final EIR, the Port plans to convert the North Terminal, north of Islais Creek, into a full container cargo facility with three container berths and one combination berth capable of handling containers or break-bulk cargo. Plans also include development of two container berths at the South Terminal, south of Islais Creek./33,34,35/ An intermodal container terminal has been constructed as part of the plan that allows for the direct transfer of cargo between ships and trains without intermediate use of highway vehicles. The Port has installed two 100-foot gauge container cranes and assoicated yard improvements at Pier 80, and gate and yard improvements at Pier 94./33/ If implemented, a proposed drawbridge across Islais Creek on port property would avoid trucking cargo over public streets between the North and South Terminals. At Pier 98, south of the container terminals, the plan would include public access, recreation, open space, and habitat preserve areas.

REGIONAL AGENCIES

San Francisco Bay Conservation and Development Commission

McAteer-Petris Act

The state McAteer-Petris Act, preceding most of the major federal and state environmental statutes of the early 1970's, created the BCDC in 1965 and authorized preparation of the San Francisco Bay Plan, to respond to piecemeal filling of the Bay that had reduced water and inter-tidal areas by more than 75%./36/ The Act covers permit authority for fill or other development activities in four geographic areas: 1) all Bay water areas and some tributaries up to the line of highest tidal action; 2) all shoreline located within 100 feet of the Bay; 3) salt ponds and managed wetlands; and 4) Suisun Marsh. BCDC's "Bay" jurisdiction also extends into areas that may be opened to tidal action, e.g., new waterways or canals, and the shoreline band adjacent to any newly created waterways in the Mission Bay project./37/

Under the provisions of the McAteer-Petris Act, BCDC may approve Bay fill in areas under its jurisdiction only for certain "water-oriented" uses specified in the law or "minor fill for improving shoreline appearance or public access to the Bay."/38/ Water-oriented uses include port facilities, water-related industry, bridges, wildlife refuges, and water-oriented recreation and public assembly. Under the Act, housing and office space, two uses for which large areas of the Bay were filled in the past, are not water-oriented uses and are not allowed on fill such as piers. Commercial, residential and office uses on land within BCDC's permit jurisdiction (the 100-foot shoreline band) must be configured to provide maximum feasible public access to the Bay./39/

BCDC also regulates dredging/40/ in its jurisdiction, on the basis of two main policies: 1) dredge spoils must be disposed of by placement on dry land for approved fill projects, or at locations in the Bay approved by the U.S. Army Corps of Engineers; and 2) all proposed waterways and canals should be designed to maintain the stability of any adjacent dikes or fill.

Land use and structural changes are governed by policies regarding public access. BCDC can require, as conditions of permits, shoreline public access improvements consistent with the project, such as, but not limited to, pathways, bicycle racks, parking, benches, or signs. As a guideline for how much public access area should be provided, BCDC in the past has required that the width of the public access strip along the shoreline of the project be equal to the height of any adjacent structure.

San Francisco Bay Plan

The San Francisco Bay Plan, adopted in January 1969 and amended on occasion since that date, is the BCDC policy document that specifies goals, objectives and policies for waterfront land use and other BCDC jurisdictional areas defined in the McAteer-Petris Act./41/ The plan addresses public access to the Bay, the effects of filling and development on the Bay, (e.g., water pollution, destruction of marshes and mudflats, air quality and weather modification, and seismic safety of filled lands). The plan concludes that the remaining water volume and surface area of the Bay should be maintained to the greatest extent feasible for the benefit and protection of Bay fish and wildlife; filling and diking should be permitted only for purposes providing substantial public benefits, and only if there is no reasonable alternative. The Bay Plan also calls for the protection of specific habitats to maintain or increase any species that provides public benefit and prevent its extinction.

Within the constraints of the McAteer-Petris Act, the Plan specifies the uses and purposes for which fill may be permitted in various parts of the Bay. From the standpoint of the San Francisco waterfront, the most important uses that might require fill are port facilities, water-related recreation, minor improvements to shoreline appearance or public access, Bay-oriented commercial recreation, and Bay-oriented public assembly. In addition, BCDC adopted the Public Access Supplement to the San Francisco Bay Plan in April 1979, which identifies possible public access development sites, appearance and design criteria, and implementation policies./42/ Within the Project Area, the Supplement identifies the public boat launch ramp near Pier 52 and Agua Vista Park, and the nearby private boat launch ramp (see VI.D. Community Services and Infrastructure, Recreation and Parks, p. VI.D.13).

San Francisco Waterfront Special Area Plan

The San Francisco Waterfront Special Area Plan, an amendment to the San Francisco Bay Plan, adopted in April 1975 (as amended), is a guide for public agencies and private parties seeking BCDC permits by identifying what fill, dredging or changes in use appear to be consistent with the McAteer-Petris Act and the Bay Plan./43,44/ The Special Area Plan makes general policy recommendations to the City Planning Commission and the Port of San Francisco, including the following: 1) city height and bulk limits (as of April 1975) should not be exceeded on any waterfront developments; 2) the entire San Francisco waterfront should be linked by a continuous pedestrian-bicycle path; 3) public open space should be provided on existing piers when there is a substantial change from maritime to non-maritime use; and 4) older buildings of architectural merit or historic significance along the waterfront should be retained. Policies addressing permitted uses on new or replacement fill in the Project Area identify public access, maritime and small-boat docking facilities as appropriate uses./45/

Permitted uses on new or replacement fill would be public access areas, and maritime and small-boat docking facilities./45/ Specific policies and recommendations include:

- Continuous public access, consistent with maritime activities, should be provided around China Basin Channel in accordance with the Recreation and Open Space Plan of the City of San Francisco, with further development of public access and waterfront recreation in the Central Basin Area; the area immediately east of the Third Street Bridge on the south side of China Basin should be reserved for public access with special consideration given to providing public viewing areas.

- Limited Bay-oriented commercial recreation should be permitted along China Basin Channel, provided it is incidental to and does not obstruct public access.

- Existing maritime uses should be continued as long as needed.

- The public launching ramp located south of Pier 50 should be retained.

- No new development should be permitted at Central Basin that is inconsistent with the above policies.

San Francisco Bay Area Seaport Plan

As noted above on p. VI.A.18, BCDC also is co-author, with the Metropolitan Transportation Commission (MTC), of the Seaport Plan, which guides Port development, non-maritime development of Port property and surface/water transportation needs of the Bay area. The Special Area Plan states that all waterfront development should be consistent with the Seaport Plan.

Metropolitan Transportation Commission

The Metropolitan Transportation Commission (MTC), created by the California Legislature in 1970, is responsible for the Regional Transportation Plan for the nine counties of the San Francisco Bay Area./46/ MTC's responsibilities also include approving transportation projects that receive state or federal funding; allocating several sources of funds for transit operations; recommending toll levels on state highway bridges in the region (excluding the Golden Gate Bridge); evaluating the performance of transportation systems and the provision of transportation services; and promoting and setting guidelines for transit system coordination.

Regional Transportation Plan

The legislation creating MTC directed it to adopt and revise annually the Regional Transportation Plan (RTP) for the nine-county San Francisco Bay Area. The RTP addresses the regional highway system, transbay bridges, mass transit systems, airports, and seaports. The plan is required to include an estimate of the regional transportation needs for the ensuing ten years and a schedule of priorities for the construction, modification, and maintenance of various segments of the regional transportation system. The RTP must also include a cost and funding plan for these improvements. Legislation passed in 1977 requires that MTC prepare a regional transportation improvement program to achieve a coordinated and balanced regional transportation system, including mass transportation, highway, railroad, maritime and aviation facilities and services. The RTP was adopted by MTC in June 1973, and has since been reviewed and updated annually./47/

Because of the interdependence of transportation planning and other regional planning, the RTP adopts policies that complement and support programs of federal, state and regional agencies. The RTP is the Transportation Element for the Regional Plan of the Association of Bay Area Governments (ABAG, see p. VI.A.27), and conversely, the land use policy of ABAG's plan guides the development of the RTP. The MTC also is affected by the plans and policies of BCDC and the California Coastal Commission.

The RTP identifies major proposals by corridor, such as the West Bay Transportation Corridor from San Francisco to Palo Alto. Mission Bay is located in the West Bay Transportation Corridor. Those proposals are also included in MTC's Peninsula Mass Transit Study and the I-280 Transfer Concept Plan discussed below (see also VI.E. Transportation, pp. VI.E.44, VI.E.46, and VI.E.48)./48/

Transportation Improvement Program

MTC annually adopts, and publishes as a separate document, a five-year Transportation Improvement Program (TIP)./49/ The TIP is an element of the ten-year Capital Improvement Program of the RTP and identifies highway and transit projects anticipated to be implemented in the next five years, based on reasonable, predictable sources and levels of funding./50/

A March 1986 amendment to the TIP reflects MTC's recent conceptual approval of elements of the I-280 Transfer Concept Program/51/: 1) demolition of the I-280 Stub to Sixth Street and construction of new touchdown ramps on King Street; 2) all Embarcadero Roadway improvements outlined in the I-280 program; 3) the MUNI Metro extension from the Embarcadero Station to the CalTrain terminal at Fourth and Townsend Streets; and 4) traffic management improvements.

San Francisco Bay Area Seaport Plan

MTC adopted revisions to the RTP in 1982 which include a maritime element based on the Seaport Plan. Policy 5.1 of the RTP states that the Seaport Plan "shall guide MTC in its decisions on seaport development and related proposals for transportation and land use development." The Seaport Plan is described in the Port of San Francisco and Bay Conservation and Development Commission discussions (see p. VI.A.18 and p. VI.A.23).

Peninsula Mass Transit Study and Proposed Joint Powers Agreement

MTC began the Peninsula Mass Transit Study in July 1984 in response to California Senate Concurrent Resolution (SCR) 74. The resolution directed MTC to study alternative rail systems for the 50-mile Peninsula corridor from San Francisco to San Jose, and to devise institutional and financial arrangements necessary to implement a long-range rail plan for the corridor. MTC examined nine different rail mode service options, but found that a final decision could not be made in the absence of a financial plan backed up by the necessary funding commitments./52/

In June 1985, MTC adopted recommendations as set forth in the SCR 74 report for future interim transit improvement options on the Peninsula corridor so as not to preempt future modal choices./53/ MTC supports the acquisition of the Southern Pacific-owned right-of-way between San Francisco and San Jose, and the SP San Bruno branch line for a possible future BART extension from Daly City. The report also recommends that the right-of-way for a possible extension of the CalTrain terminal to downtown San Francisco be reserved; and that MUNI Metro be extended to the CalTrain terminal at Fourth and Townsend Streets to serve the Mission Bay development and provide a short-term link between Peninsula rail service and downtown San Francisco, MUNI Metro and BART. Goals and objectives of the Peninsula Mass Transit Study are discussed further in VI.E. Transportation, p. VI.E.45.

In May 1987, MTC adopted a motion requesting further information evaluating the effects of a proposed extension of CalTrain to the Transbay Terminal. Consequently, a Peninsula Corridor Joint Powers Board (JPB) was established in July 1987 for an interim period, consisting of representatives from Santa Clara County Transit District, SamTrans, and the City and County of San Francisco. The JPB is authorized to complete studies necessary to analyze such an extension and the acquisition requirements involved. In March 1988, MTC adopted a resolution that sets forth a financing plan under the New Rail Starts Program for the proposed extension to the Transbay Terminal. The financing would include federal funding and contributions from the three JPB counties. The work includes preparation of a federal Draft Environmental Impact Statement that would analyze alternative CalTrain station locations./53/

San Francisco Bay Regional Water Quality Control Board

The San Francisco Regional Water Quality Control Board (RWQCB), the regional office of the State Water Resources Control Board (SWRCB), was created by the state Porter-Cologne Water Quality Control Act, last amended in January 1985. It is empowered to monitor surface and ground water quality and issue discharge permits in the Bay Area region. The SWQCB is also designated as the state water pollution control agency for implementation of the federal Water Pollution Control Act (US Code, Title 33, Sections 125 et seq.) as amended through 1980 (see discussion of this Act in Appendix L. Hazardous Wastes, p. XIV.L.4). Permits are required for wastewater treatment plant outflow and other discharge or run-off which may affect water quality. RWQCB's principal involvement with the Mission Bay project would be to comment on any Army Corps of Engineers dredging-permit applications.

In 1975, the RWQCB and State Resources Agency adopted the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan). The Basin Plan is discussed in VI.L. Hydrology and Water Quality, p. VI.L.1-VI.L.3./54/ The plan calls for water quality protection and enhancement of beneficial uses of the San Francisco Bay estuarine system, wastewater reclamation, and pollution control measures. The RWQCB regulates the water quality of China Basin Channel as part of Bay and groundwater quality. In addition, the U.S. Environmental Protection Agency requires that the RWQCB regulate discharge and run-off into state waters from urban environments, discharge and run-off from industrial uses, and focuses its attention on pollution-creating uses such as chemical plants./55/

The responsibilities of the SWRCB are carried out at the regional level by the RWQCB. The RWQCB is required to ensure adequate protection of water quality and statewide uniformity in siting, operation, and closure of waste disposal sites. In addition, the SWRCB delegates authority to the RWQCB for maintaining an inventory of underground storage tanks and overseeing any clean-up associated with leaking tanks. See VI.N. Hazardous Wastes, p. VI.N.3 for more information on the RWQCB. Permitting of underground storage tanks in San Francisco is done by City and County agencies, at the direction of the RWQCB.

Bay Area Air Quality Management District

The Bay Area Air Quality Management District (BAAQMD), originally known as the Bay Area Air Pollution Control District, was created in 1955. The district's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties, and portions of Solano and Sonoma Counties. Its authority is exerted through the regulation of stationary pollution sources, such as industrial plants and agricultural burning to attain and maintain air quality standards throughout the Bay Area.

The Federal Clean Air Act of 1967, the Clean Air Act of 1970, and subsequent amendments in 1977 directed the Environmental Protection Agency to require each state to prepare a State Implementation Program (SIP) for meeting ambient air quality standards. Those acts resulted in a collaboration of efforts among the Association of Bay Area Governments (ABAG), MTC and BAAQMD to develop a Bay Area Air Quality Plan, adopted in 1979./56/ A 1982 revision of this plan is a part of the SIP and the ABAG San Francisco Bay Area Environmental Management Plan.

The Air Quality Plan describes air quality problems, federal air quality standards, and control programs to attain ozone and carbon monoxide standards, the two air pollutants whose levels exceed federal standards in the Bay Area. The district measures, monitors, and regulates organic and inorganic pollutant emissions, establishes emission and performance standards for new stationary sources or criteria and hazardous air pollutants, and reviews and comments on environmental documents for competency in air quality matters./57/ Regulation 11 contains the BAAQMD rules for hazardous pollutants that include: lead, asbestos, beryllium, mercury, vinyl chloride and benzene. The asbestos rule (Rule 2) contains requirements for building demolition and asbestos disposal which minimize the airborne release of asbestos to the atmosphere. Regulation of hazardous pollutants is discussed in VI.F. Air Quality, p. VI.F.1-VI.F.3, and VI.N. Hazardous Wastes, pp. VI.N.1-VI.N.5.

For Mission Bay, required air emissions permits would be the responsibility of industrial tenants or operators, and not the developer. All industrial and maritime uses would be subject to BAAQMD regulations and would require a permit application after the specific activities were known./58,59/ Air quality standards and plans are further discussed in VI.F. Air Quality, p. VI.F.2.

Association of Bay Area Governments

ABAG is an association of Bay Area counties and cities whose purpose is to provide a forum where members can reach agreement on issues of common concern on a regional.

rather than local, basis. In essence, ABAG is a metropolitan planning organization which works in conjunction with MTC and BAAQMD (see pp. VI.A.23, VI.A.26 and p. VI.F.2).

ABAG prepares projections of population, jobs, and housing growth for the Bay Area every two years. Although ABAG's projections are used to guide public policy, they are not policies in and of themselves. Therefore, they are not analyzed in the Public Plans, Policies, and Permits Impact section. ABAG's projections are discussed in depth in VI.B. Land Use, Business Activity and Employment, p. VI.B.69; Appendix B. pp. XIV.B.27-VI.B.30; VI.C. Housing and Population, p. VI.C.44; and Appendix C. pp. XIV.C.14-XIV.C.19.

STATE AGENCIES

California State Lands Commission

California became the owner of all lands underlying navigable waterways, including tidelands, within the state when it was admitted to the Union in 1850./60/ Most of those lands still are owned by the state or the legislature's public grantees under jurisdiction of the State Lands Commission (SLC). Port lands are state sovereign lands held in trust by the Port of San Francisco for the people of the State of California pursuant to the Burton Act and 1968 Transfer Agreement (see p. VI.A.16). The public trust doctrine of the California Constitution defines allowable uses of submerged and tidelands as "commerce, navigation and fisheries, recreation and preservation of those lands as ecological units."

The SLC has stated that if the Project Area includes such sovereign lands, use of those lands must be consistent with the provisions of the Burton Act, the 1968 Transfer Agreement, and the public trust (see p. VI.A.16)./61/ The nature and extent of such sovereign interests within the Project Area, if any, have not yet been fully determined. If so identified, sovereign lands may be exchanged for other lands if certain limited conditions can be met, pursuant to Public Resources Code Section 6307. The Port of San Francisco, as grantee, would have a role in determining those conditions with the SLC as part of the overall process. The lands so exchanged would have to be found by the SLC and Port to be no longer available or useful or susceptible of being used for public trust purposes; the value of the lands received in exchange would have to be equal to or greater than the value of the lands given up; and the exchange would have to be in the best interests of the state. The SLC and the Port would work together with the land owner of record to determine the feasibility of such an exchange./61/

California Public Utilities Commission

The California Public Utilities Commission (CPUC) sets the rates and regulates the service of transportation and utility companies in California./62/ In the Mission Bay area, the CPUC regulates CalTrain passenger service. Changes in that service would require CPUC approval. Under CPUC General Order No. 36-E, CalTrain would need CPUC consent before abandoning or relocating the CalTrain Station at Fourth and Townsend Streets./63/ The CPUC's "Rules of Practice and Procedure" would require public notice, a formal CPUC application and a public hearing prior to such an action on the station.

CPUC has stated that reduction in freight train service in the area or removal of freight rail trackage at the Mission Bay Project Area also would require its approval./64/

California Department of Transportation

CalTrain Peninsula Commute Service Plan

The California Department of Transportation (Caltrans) annually prepares a five-year, Short-Range Transportation Plan (SRTP) to comply with federal Urban Mass Transportation Administration (UMTA) planning requirements for capital and operating assistance grants and the MTC Regional Transportation Plan./65/ The five-year plan also complies with improvements recommended in MTC's Peninsula Mass Transit Study (see MTC discussion, p. VI.A.25).

On July 1, 1980, Caltrans and the Southern Pacific Transportation Company (SP) entered into an agreement that expires in 1990 under which SP would continue to operate the San Jose - San Francisco commuter railroad service, but local and state governmental entities would administer it./66/ The agreement expressed the state's intention to purchase the Peninsula train stations from SP or its successors, including the San Francisco station at Fourth and Townsend Streets, and SP's agreement to allow Caltrans to lease them with the option to purchase. Caltrans has notified SP and SFP that it plans to purchase the Fourth and Townsend station building site./67/

The SRTP states that the objective of Caltrans is to extend CalTrain service from the Fourth and Townsend Street station to San Francisco's central business district, and calls for securing the necessary federal, state and local approval and funding to complete this extension by 1992. The alignment preferred by Caltrans for the proposed extension is from the existing Fourth and Townsend terminal underground beneath King Street, parallel to the Embarcadero, northwest to Main Street, and turning west to the new terminal site between the existing Transbay Terminal and Howard Street.

As with any proposed change in CalTrain operations, a station relocation would require approval of the Project Management Committee (PMC), comprised of representatives of SP, Caltrans, Santa Clara County Transit District, San Mateo County Transit District, and San Francisco Municipal Railway./68/ Any decision of the PMC involving changes in CalTrain operation would require review by PMC members, local policymaking boards and commissions. MTC has approval authority over the on-going public subsidy of the CalTrain service and would assess the station relocation's potential effects on regional transportation (see p. VI.A.25).

Removal of the I-280 Freeway Stub

On September 19, 1986, the Federal Highway Administration authorized Caltrans and the City and County of San Francisco to proceed with preliminary engineering and environmental analysis on three I-280 Transfer Concept Program (TCP) projects./69/ One of those projects includes removing the I-280 freeway stub in the Project Area from Third to Sixth Streets and constructing new touchdown ramps. Caltrans is the lead agency for this project, and is working with San Francisco, MTC, the California Transportation Commission, Federal Highway Administration, and private land owners to resolve what private funds, I-280 TCP funds and other public funds, should be devoted to demolition of the stub and construction of new ramps. These groups also must reach agreement on the configuration of new freeway on- and off-ramps.

In March 1986, the MTC amended its Transportation Improvement Program to approve conceptually elements of the I-280 TCP, including demolition of the I-280 stub and construction of new touchdown ramps (see p. VI.A.24). When Caltrans, MTC, San Francisco, and private land owners resolve public and private financing, the individual projects that comprise the I-280 TCP must be approved by the MTC and be listed in its Transportation Improvement Program.

California Department of Fish and Game

The California Department of Fish and Game's (CDFG) overall objective is "to maintain all species of fish and wildlife for their intrinsic and ecological values, as well as for their direct benefits to man."/70/ The department would review the Mission Bay EIR with concern for protection and enhancement of the quality of the fish and wildlife habitat provided in China Basin Channel, the China Basin area and the Bay, particularly as affected by China Basin Channel water quality.

Under Section 1601-03, Stream Alteration Agreements, of the California Fish and Game Code, a project proponent must obtain an agreement from CDFG for any alteration to a stream bed channel, or the flow of waters in a channel, if the stream or channel has significant wildlife values. CDFG has not yet determined if the Mission Bay project would require a Stream Alteration Agreement for alterations to China Basin Channel; it is CDFG's general policy to review the project EIR before making this determination.

Under the federal Fish and Wildlife Coordination Act of 1958, CDFG would review permit applications to the U.S. Army Corps of Engineers if any are required for the project, and participate in any review and permitting procedures required by BCDC. In its review of Corps (discussed below) and BCDC permits, CDFG's concerns would focus on potential effects of dredging and filling of Bay waters or any alteration of the shoreline on the area's fish and wildlife habitat. The CDFG also would review applications for National Pollutant Discharge Elimination System permits which may be required by the San Francisco Bay Regional Water Quality Control Board./71/

Department of Health Services

The Department of Health Services (DOHS) is the primary state agency regulating public health, including hazardous materials and wastes. The responsibilities of DOHS in that area are described in VI.N. Hazardous Wastes, p. VI.N.3-VI.N.4.

FEDERAL AGENCIES

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers is the primary federal permit authority for projects in or affecting navigable waters of the U.S./72/ The Corps would review those features of the Mission Bay project that involve structures or dredging within the channel area or on the Bay shoreline, or propose discharges of dredged material into waters of the U.S. Water quality, navigation, protection of water edges, flood protection, and aquatic habitats are some of its concerns.

U. S. Coast Guard

The Coast Guard's primary responsibility is to preserve and enhance the navigability and safety of navigable waters of the United States./73/ Under Section 9 of the River and Harbor Act, the Coast Guard has permitting jurisdiction for bridges over navigable waters, including the two drawbridges on China Basin Channel at Third Street and Fourth Street. These drawbridges are operated and maintained by the San Francisco Department of Public Works, under Coast Guard operating regulations./74/ Modifying the bridges, or construction of a new bridge, would require a Coast Guard Bridge Permit./75/ A Coast Guard Bridge Permit requires prior approval by the Regional Water Quality Control Board (see p. VI.A.26).

The Coast Guard operates utility and patrol boats to respond to crime, fire and distress calls in the Bay and at sea. The Coast Guard's emergency response roles are further described in VI.D. Community Services and Infrastructure, p. VI.D.3. The Coast Guard also has the authority to require safety measures, such as navigation lights or channel markers, within navigable waterways, but does not directly issue a permit for waterway safety. It instead participates in the Corps of Engineers Section 10 permit process with particular concern for water safety and navigability. The Coast Guard must authorize any other proposed aids to maritime navigation, through approval of a Private Aids to Navigation Application.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (FWS) does not have direct permit authority, but influences decisions on fish and wildlife habitat through its role as a commenting agency to Corps of Engineers permit applications. Under the Fish and Wildlife Coordination Act of 1958, FWS must be consulted on federally funded, licensed or permitted projects. The Endangered Species Act of 1973 requires federal and state agencies and private applicants to consult with FWS when a project might jeopardize the habitat of listed endangered or threatened species.

The primary concern of FWS would be the effects of Mission Bay development on migratory birds and water quality in China Basin Channel and San Francisco Bay./76/ The FWS would also comment on applications to the San Francisco Bay Regional Water Quality Control Board.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) reviews federally permitted projects that have the potential of altering aquatic environments and thereby affecting biological resources that depend upon those habitats./77/ With regard to Mission Bay, NMFS stated that disruption of herring spawning grounds located near the mouth of China Basin Channel by dredging or water quality degradation is a concern./78/

The NMFS usually discourages waterfront activities that: do not require waterfront access to function efficiently; discharge sediments or contaminated substances into the Bay; suggest obvious, direct or indirect adverse impacts to fish resources; and suggest a cumulative adverse impact to fish resources when combined with similar activities in the Bay./79/

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is the primary federal agency involved in regulating hazardous materials and hazardous wastes. The responsibilities of EPA with regard to hazardous wastes are described in VI.N. Hazardous Wastes, p. VI.N.4-VI.N.5.

COMPARISON WITH ALTERNATIVES

This section describes the implications of the Mission Bay Alternatives for applicable local, state and federal plans and policies at full build-out. It identifies how Alternatives compare with objectives and goals of the various agencies and plans outlined above, and ends with a discussion of types of permit review likely to be required for each Alternative. The year 2000 is not addressed because any rezoning, amendment or revision of plans or policies would apply to the Alternative as a whole. One agency's policies may not be consistent with those of another agency, and within one agency, policies of one plan may seem to contradict the policies of another. Contradictions are usually the result of the plan's age, and how agency priorities have evolved. Whenever possible, the text identifies an agency's overall policies or concerns with (and jurisdiction over) Mission Bay.

This section analyzes in detail those plans and policies on land use concerns not covered elsewhere in the EIR. Agency plans and policies pertaining to other specific technical topics (e.g., urban design, transportation, water quality, air quality) are discussed in the respective technical section of this report. This section summarizes the impacts for each of these topics, and provides a cross-reference to the full discussion.

LOCAL AGENCIES

City and County of San Francisco

Central Waterfront Plan

The Central Waterfront Plan's general objectives and policies target residence, commerce, land use, industry, maritime, recreation and open space and subarea-specific policies related to the Mission Bay Project Area and adjacent lands (see pp. VI.A.2-VI.A.5). The relationship of each Alternative to the Central Waterfront Plan's objectives and policies is summarized in Table VI.A.1.

Alternatives A and B would require amendments to the Central Waterfront Plan to address policy inconsistencies with the project. Although a final decision has not yet been made as to the exact scope of the amendment, the Department of City Planning most

TABLE VI.A.1: CONSISTENCY OF MISSION BAY EIR ALTERNATIVES WITH THE CENTRAL WATERFRONT PLAN/a/

Objectives and Policies	Alternative A	Alternative B	Alternative N
Overall Goals			
Goal 1: Increase employment opportunities for San Francisco's unemployed and underemployed residents.	By 2020, there would be about 25,000 jobs in the Project Area, about half of which would be expected to be held by San Francisco residents, responding to this overall goal. About 12,700 person-years of construction jobs would be created during the build-out period. It is not possible to predict how many of these would be filled by unemployed or underemployed residents (see VI.B.83-VI.B.93).	By 2020, there would be about 6,200 jobs in the Project Area, half of which would be expected to be held by San Francisco residents. About 9,900 person-years of construction jobs would be created during the build-out period. It is not possible to predict how many of these would be filled by unemployed or underemployed; more housing under Alternative B could increase the percent of jobs held by residents, but the total number of jobs would be much less than that in the other Alternatives (see VI.B.83-VI.B.93).	As with Alternatives A and B, Alternative N would generate employment opportunities for San Francisco residents; by 2020, under M-2 zoning, there would be about 17,250 jobs in the Project Area, about half of which are expected to be held by San Francisco residents; most of these jobs would be in crafts, operatives and other laborer occupations (see VI.B.83-VI.B.93). About 4,200 persons-year of construction jobs would be created.
Goal 2: Enhance the working environment to stimulate business growth.	Infrastructure improvements such as new streets, open space, mass transit, parks and community facilities and 4.1 million gsf of office, 250,000 gsf of retail, and 3.6 million gsf of S/LI/RD space would stimulate business growth in the area.	Same as Alternative A, although the amount of new office, retail and S/LI/RD space would be substantially less under this Alternative, and therefore, business growth would be less than that in Alternative A.	No master-planned infrastructure improvements are expected; therefore, business growth would be less than that under Alternative A but more than that under Alternative B.
Goal 3: Improve the area's appearance and attractiveness.	See above discussion; this Alternative would improve the area's appearance.	Same as Alternative A.	See above discussion. Alternative N would not stimulate new master-planned infrastructure improvements, creation of major new open space or recreational uses and, therefore, would not necessarily respond to this goal.
General Objectives			
Land Use: Preserve and promote the Central Waterfront area for San Francisco's industrial activities while developing residential, commercial and recreational uses on surplus land that complement industrial and maritime activities.	In general, Alternative A would not promote industrial activities; residential, commercial and recreational uses under Alternative A could conflict with existing industrial and maritime uses and cause their displacement.	Same as Alternative A.	Alternative N would develop under existing M-2 zoning, allowing for retention and expansion of industrial activities; no residential or recreational uses would be developed on surplus land; a small amount of retail uses would be developed.
Industry: Retain, expand and protect industrial activity by rehabilitating old structures, developing vacant	S/LI/RD space would provide space for light industrial activities; however, the Project Area would have mostly	Alternative B would provide mostly housing and only a small amount of S/LI/RD space, and therefore,	M-2-type uses would develop west of Third Street, creating an industrial park area which would be consistent

(continued)

TABLE VI.A.1: CONSISTENCY OF MISSION BAY EIR ALTERNATIVES WITH THE CENTRAL WATERFRONT PLAN/a/ (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
land, consolidating rail operations, establishing job training, financing programs for new development, and removing overly restrictive city codes related to industry.	residential/office uses which would not allow for the retention, expansion or protection of industrial uses. Rail operations would be consolidated.	generally would not respond to this objective. Rail operation would be consolidated.	with the objective to preserve industrial activities; fewer remaining rail operations would be consolidated; east of Third would include maritime related uses.
Maritime: Retain and expand existing maritime activities; encourage development of container terminals along the waterfront; reserve land adjacent to waterfront for maritime support use.	Residential, recreation and S/LI/RD uses east of Third Street would not be consistent with expansion of maritime activities or allow for maritime support activity. Development of a container terminal adjacent to the Project Area could not take place as the required backland to support a terminal would be developed with residential uses; Pier 62 would be developed as part of a park. Maritime support businesses generally could not afford to lease the S/LI/RD space provided east of Third Street.	Same as Alternative A.	Maritime activities could expand in Port-Related/M-2 area; container terminal development could take place adjacent to the Project Area as the necessary backland would be available.
Commerce: Provide commercial and water-oriented recreational activities to serve the area's residents and businesses while preventing office development that is not directly related to industrial and maritime activities.	Office space, not directly related to industrial and maritime activities, would be provided; commercial and recreational uses would be provided to serve the area and the Alternative's new resident population.	One million square feet of office space, not related to industrial or maritime uses, would be provided west of Owens Street; commercial and recreational uses would serve existing residents and future residents and businesses.	Office space would be provided in the Third-Townsend block outside the area covered by the plan; no major commercial or water-oriented recreational uses are expected to develop.
Residence: Retain existing housing and residents; promote new housing in established residential areas and near China Basin Channel, including development of low- and moderate income units.	7,700 new residential units would be introduced to areas now vacant or used for industrial activity, as well as along China Basin Channel; about 2,300 moderate- and middle-income units would be provided. The houseboat community would remain.	About 10,000 dwelling units, 3,000 of which would be available to moderate- and middle-income families, would be provided; housing would be developed along China Basin Channel. The houseboat community would remain.	No new residential units would be developed under this Alternative; the houseboat community would remain.
Transportation: Improve citywide and regional auto, truck and pedestrian access to the Central Waterfront, including extending light-rail service to the area.	Development of new streets (and grid pattern) would improve access to the area; MUNI light-rail and bus service would be extended into the Project Area; a new King Street on-ramp would improve access to the Project Area.	Same as Alternative A.	MUNI light-rail service would be extended to the existing CalTrain station (Townsend and Fourth Streets); no new bus service is expected to be provided; some new streets would be constructed to serve M-2 area; a new King Street on-ramp would be constructed.
Recreation and Open Space: Provide access to the waterfront and recreational resources in the area, compatible with industrial and maritime activities.	Alternative A would provide 43.3 acres of new parkland with both passive and active open space (such as ball fields, pedestrian and bike paths); access to the China Basin Channel would be continuous, connecting the	Same as Alternative A, except that this Alternative would provide 48 acres of new parkland and 33.8 acres of new wetlands at three locations.	No new public open space, wetlands, or recreational uses except for a narrow open space strip along the channel totalling about five acres; this would be compatible with existing industrial and maritime activities.

(continued)

TABLE VI.A.1: CONSISTENCY OF MISSION BAY EIR ALTERNATIVES WITH THE CENTRAL WATERFRONT PLAN/a/ (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
	channel with a waterfront park at Pier 62; these uses may not be compatible with existing industrial and maritime activities.		
Urban Design: Design new development to be compatible with existing topography, limit height and bulk along the waterfront, and protect and create views of downtown and the Bay.	Alternative A would have a "bowl" pattern of more intense development around less intense development. The pattern would relate the existing flat topography of the Project Area to the higher elevation of Potrero Hill and higher buildings of downtown. No high-rise structures are proposed. New buildings would reduce views of the Bay from Potero Hill and street-level views of downtown. Alternative A would create new open space along the channel and east of Third Street. (See Table VI.I.2, p. VI.I.19.)	Generally the same as Alternative A; heights would be reduced near the Bay. Alternative B would also create views of additional open space within the Project Area, and near the Bay waterfront. (See Table VI.I.2, p. VI.I.19.)	For purposes of analysis, Alternative N is assumed to have a more uniform scale of development than would Alternatives A or B, generally up to four stories, with less view blockage. However, existing height limits would allow buildings up to 130 and 200 feet in height in the center of the Project Area. No major new open space would be created. (See Table VI.I.2, pp. VI.I.19.)
China Basin Subarea			
Objective 1: Expand maritime activity in the China Basin area, expand and continue the use of Piers 48 and 50 for general cargo, and add a general cargo facility at Pier 62.	Maritime activities in the China Basin Area would not expand under Alternative A; Pier 62 would be developed as part of a park; Piers 48 and 50 could continue to operate as general cargo facilities.	Same as Alternative A except that Pier 62 would be developed as wetlands.	Maritime activities could expand under this Alternative; Piers 48 and 50 could continue to be used as general cargo facilities; and Pier 62 would be available for future maritime development.
Objective 2: Provide public access to the waterfront, develop a new waterfront recreation area along both sides of China Basin Channel, and relate the scale of new development to San Francisco's distinctive hill form, the adjacent waterfront and existing development.	See discussion above under Recreation and Open Space and Urban Design objectives.	See discussion above under Recreation and Open Space and Urban Design Objectives.	See discussion above under Recreation and Open Space and Urban Design Objectives.
Objective 3: Develop a mix of new uses on surplus rail property in the China Basin Area.	Residential, office, retail, hotel, recreation, and S/LI/RD uses would be developed on surplus rail property to create a mixed-use residential neighborhood.	Alternative B would create a predominantly residential neighborhood with major new open spaces and some retail and office space.	Alternative N would develop M-2 and port-related uses which would be similar to some existing uses and would add some new uses but would not constitute a mixed-use neighborhood.
Policy 1: Identify land surplus to the operating needs of the railroad, and the Port. Encourage the consolidation of rail operations, either internally, or jointly, as a means of releasing land for alternative uses.	Rail operations would be consolidated; existing levels of service would be maintained for Port and other industrial activities along the waterfront	Same as Alternative A.	Existing trackage could remain where development does not take place; levels of existing service would not change; however, a large amount of surplus rail land would be freed for M-2 industrial uses.

(continued)

TABLE VI.A.1: CONSISTENCY OF MISSION BAY EIR ALTERNATIVES WITH THE CENTRAL WATERFRONT PLAN/a/ (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
Policy 2: Consistent with the operating needs of the railroads, develop a mixed-use neighborhood with predominantly residential uses in the area south of China Basin Channel and west of Third Street. Include compatible commercial and light industrial uses.	A mixed-use residential neighborhood would be developed west of Third Street and south of the channel, with retail and S/LI/RD uses.	Uses south of the channel and west of Third would be primarily residential and open space uses, with limited office use.	No residential units would be expected to develop; the Project Area would develop with commercial and light industrial uses, west of Third; east of Third would continue to include maritime-related uses.
Central Basin Subarea			
Objective 1: Expand maritime activity by reserving the water area, piers, seawall lots and 60 acres of backland for development of a container facility.	Water area and piers could continue to be used for maritime activity; seawall lots and 60 acres of backland would not be available for development of a container terminal as they would be developed with residential, recreation and S/LI/RD uses.	Same as Alternative A, with the addition of wetlands east of Third Street.	All of the area east of Third Street, including water areas, piers, and seawall lots would be available for and expected to continue to include maritime activities; 60 acres of backland would be available for development of a container terminal.
Objective 2: Retain and expand industrial uses by encouraging more intensive use of existing industrial land and facilities.	Some more intensive use of existing industrial land would occur in those areas designated for S/LI/RD uses; this intensification would be limited to the southeast corner of the Project Area within the boundaries of the Central Basin Subarea.	Same as Alternative A.	Industrial uses west of Third Street would intensify under M-2 zoning; industrial uses east of Third Street would not intensify much more than the existing level.
Objective 3: Improve and expand the waterfront recreation areas at Warm Water Cove and Central Basin which includes continued use of the public boat ramp at Pier 50 and expanding the recreation area at Central Basin with a public beach, waterfront park and small-boat marina.	Development of the Project Area would not conflict with this objective.	Same as Alternative A.	Same as Alternative A.
Showplace Square Subarea			
Objective 1: Develop a major Design Center in the area.	Development of Alternative A would complement and reinforce the continued development of the Showplace Square area as a major design center and provide S/LI/RD space along Seventh and Owens Streets for eastward expansion of this use into the Project Area.	Development of Alternative B would not conflict with this policy, although it would not provide space for this type of activity to expand east; rather, showroom uses could expand west into the Inner Mission or south and east, away from downtown, under this Alternative.	Same as Alternative A; new showroom uses could expand eastward into M-2 areas.

(continued)

TABLE VI.A.1: CONSISTENCY OF MISSION BAY EIR ALTERNATIVES WITH THE CENTRAL WATERFRONT PLAN/a/ (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
Objective 2: Enhance pedestrian circulation and the movements of goods to and from the area.	Transportation improvements, including new pedestrian paths, sidewalks, and streets would help to improve access and circulation to the Showplace Square area. Truck routes would be designated to improve goods movements. MUNI Metro would be extended to Seventh and Channel which would connect the Showplace Square area with downtown; a new I-280 on-ramp would be constructed, at King Street; the I-280 stub would be removed.	Same as Alternative A.	Transportation improvements would not include a new street grid; however, the I-280 stub would be removed, a new King Street on-ramp would be constructed and MUNI Metro would be extended to the CalTrain Station at Fourth and Townsend Streets. Truck routes would be designated.
Lower Potrero Subarea			
Objective 1: Retain and expand industrial uses.	Alternative A would accelerate new business activity in existing space; S/LI/RD space in the Project Area would allow for continued use of industrial space by lower-rent-paying uses; generally it would upgrade the area's image and amenities; older uses adjacent to the site may be forced to locate further south. S/LI/RD space along Mariposa Street would allow for expansion and retention of some industrial uses.	Alternative B would create more competition for existing industrial space as very little S/LI/RD space is provided under this Alternative; Project Area residential uses adjacent to the Lower Potrero Area would be incompatible with large-scale industrial and maritime uses south of the Project Area and could cause more pressure for change than that incurred under the other Alternatives.	Alternative N would have the least effect on industrial areas south of the Project Area; the large amount of M-2 space provided by this Alternative would result in less pressure for redevelopment and change of use; industrial uses in the Lower Potrero Area would be retained but would not expand much.
Objective 2: Preserve and improve the existing residential neighborhood.	Development of Alternative A as a mixed-use residential neighborhood would complement existing residential areas in Potrero Hill.	Same as Alternative A.	Continuing use of the Project Area as an industrial business park would not directly affect the residential neighborhood of Lower Potrero.
Islais Creek Subarea:			
Objective 1: Expand maritime activity by modernizing Pier 80 for general cargo handling.	Development of Alternative A would not conflict with modernization of Pier 80 and would not affect Port capital improvement plans in the Islais Creek area. Those improvements could potentially accommodate maritime uses near the Project Area that would not expand under Alternative A (see China Basin Subarea, Objective 1.)	Same as Alternative A.	Alternative N would not conflict with modernization of Pier 80 at Islais Creek.

(continued)

TABLE VI.A.1: CONSISTENCY OF MISSION BAY EIR ALTERNATIVES WITH THE CENTRAL WATERFRONT PLAN/a/ (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
Objective 2: Retain and expand industrial uses.	Development of the Project Area would not affect industrial uses near Islais Creek; it could promote the expansion of these uses in the Islais Creek area as existing industrial uses in the Project Area could be relocated to Islais Creek.	Same as Alternative A.	Development of the Project Area with continuing M-2 uses would not affect this objective.
Objective 3: Develop recreational uses along Islais Creek Channel.	Development of Alternative A would not affect the development of recreational uses along Islais Creek Channel.	Same as Alternative A.	Same as Alternative A.

/a/ San Francisco Department of City Planning, Central Waterfront Plan, adopted by the City Planning Commission, Resolution 8631, July 3, 1980.

SOURCE: Environmental Science Associates, Inc.

likely would revise the overall goals and general objectives of the Central Waterfront Plan, and the subarea objectives and policies under the plan for the China Basin and Central Basin Areas to reflect development of Mission Bay. The amendment would either create a new Mission Bay Area for the Central Waterfront Plan encompassing a slightly expanded China Basin Area and a portion of the Central Basin Area of that plan, or remove the Project Area from the overall geographic area covered by the Central Waterfront Plan and create a separate Mission Bay Special Area Plan. The objectives and policies of a subarea plan of the Central Waterfront Plan or a Special Area Plan for either Alternatives A or B would reflect the differences between the two Alternatives as described below. The Mission Bay Plan (henceforth "Special Area Plan") would include the type and location of infrastructure improvements, open space development and community facilities, social and economic objectives agreed to by the City and project sponsor. The land use plan and its objectives, policies, and design guidelines would be incorporated into the development agreement between the City and project sponsor.

The final Mission Bay Special Area Plan would receive extensive public review and would be further revised to reflect public input. The plan would then be subject to City Planning Commission review and adoption as part of the City's Master Plan.

Alternative A. In general, Alternative A would not respond to the Central Waterfront Plan's overall objectives and goals to expand maritime and industrial activities in the Central Waterfront area, particularly on Port property east of Third Street, and would not provide adequate area for container terminal backland east of Third Street. Alternative A would not respond to the plan's Commerce policy to prevent office space development in the Central Waterfront area that is not directly related to industrial and maritime uses; Alternative A would provide about 3.1 million square feet of office space north of China Basin Channel in the plan area (and about one million outside). Alternative A would respond to the plan's China Basin subarea policy to create a mixed-use residential neighborhood west of Third Street on surplus rail property and to develop recreational resources along China Basin Channel.

Alternative A would not respond to the plan's overall goal to create an environment conducive to the retention and expansion of San Francisco industrial and maritime activities or to establish a land base in the Central Waterfront area for these uses.

A Special Area Plan for Alternative A would respond to plan goals by setting forth objectives and policies to develop the Project Area as a mixed-use residential neighborhood, providing major employment opportunities, city-serving commercial services, community facilities, and open space and recreational amenities. Overall objectives that could realize the development scenario under Alternative A are summarized below. The objectives and policies generally reflect those developed by the Department of City Planning in the Mission Bay Proposal for Citizen Review./80/

- Create an image, sense of purpose, and a means of orientation that integrates Mission Bay with surrounding districts, activities and the Bay;
- Create a variety of uses in Mission Bay with housing as a high priority to substantially increase the City's supply of housing;
- Take advantage of the unique natural and built environment of the Mission Bay area and orient development to the Bay and Downtown;
- Provide a mixture of housing, both in size and affordability, being sensitive to placement next to incompatible uses;
- Preserve notable landmarks and areas of historic, architectural or aesthetic value that provide Mission Bay with a sense of past;
- Relate the scale of development to the adjacent waterfront and existing maritime and industrial activities along the waterfront, while providing maximum waterfront public access;
- Maintain and enhance a sound and diverse economic base and fiscal structure for Mission Bay by providing commercial development complementary to Downtown, protecting existing maritime activities, and promoting job training programs for local residents;
- Coordinate transportation improvements in the Mission Bay area with regional and local planning efforts, including the removal of the I-280 stub, extension of MUNI Metro into the area and the creation of a new street grid and pedestrian network to provide efficient traffic flow;
- Provide major new open space and recreational resources to serve Mission Bay and City residents and take advantage of the area's natural amenities, such as the Bay and China Basin Channel; and
- Provide for general safety services and recreational facilities and encourage development of cultural resource facilities in Mission Bay.

Alternative B. As with Alternative A, Alternative B would not respond to the Central Waterfront Plan's overall objective to expand maritime and industrial activity, since land east of Third Street would be developed for housing, open space and S/LI/RD uses. Alternative B would respond to the objectives and policies for the China Basin subarea by creating a residential neighborhood on surplus rail property west of Third Street and developing recreation uses around China Basin Channel.

The objectives and policies for Alternative B would be similar to those outlined for Alternative A with these major differences: A Special Area Plan for Alternative B would create a residential neighborhood with major open space and wetlands resources, and limited office and industrial space and, thus, limited employment opportunities.

Alternative N. In general, Alternative N would respond to the overall objectives of the Central Waterfront Plan by continuing maritime and industrial uses east of Third Street. Alternative N would not alter rail and truck access to Port property; Alternative N would be consistent with the policy to provide adequate rail and truck service to existing and future industrial uses east of Third Street. The Project Area would remain zoned M-2 (Heavy Industrial). The area west of Third Street would be expected to develop with low-rise buildings for light-industrial warehouse uses; office use would be concentrated on the block north of the channel bounded by Third, Fourth, Townsend, and Berry Streets. Alternative N would not create a residential neighborhood west of Third Street on surplus rail property, as called for in China Basin subarea objectives. (See VII. Variations on Alternatives, pp. VII.1-VII.9, for a variant of Alternative N that would include about 1,000 housing units south of the channel.)

Port-Related/M-2 uses would be similar to existing uses east of Third Street; that area would undergo less major change than would the area west of Third Street. Container terminal development would be a long-term option, as sufficient backland would be available east of Third Street.

Alternative N would not require either an amendment to the Central Waterfront Plan or a new Special Area Plan.

Adopted Plans and Proposals for Citizen Review Affecting Nearby Areas

The following subsection addresses the impacts of the Mission Bay Alternatives on policies of plans for Nearby Areas. Some of those plans, whether adopted or proposals for citizen review, are discussed in the Setting for informational and contextual purposes. Those plans include the Downtown Plan, Yerba Buena Center Redevelopment Plan and the South Bayshore Plan. The Mission Bay Alternatives would not directly affect those plans' policies (and those policies would not directly affect development of the Alternatives).

therefore, they are not discussed here. The Northeastern Waterfront Plan, the Rincon Hill Plan, the Rincon Point - South Beach Redevelopment Plan, and the proposed South of Market Plan have specific policies directly related to the Project Area. Policy impacts for each plan are assessed in the following discussions for each Alternative. None of the Alternatives would directly affect the implementation of any of the following plans.

Alternative A

Northeastern Waterfront Plan. Alternative A would be compatible with similar uses proposed for the adjacent North China Basin subarea of the Northeastern Waterfront Plan. Recreation and open space uses proposed under Alternative A would complement the proposed waterfront park and recently completed South Beach marina north of the Project Area. Alternative A would extend MUNI Metro light-rail service to connect the northern waterfront area with the Project Area.

Alternative A would not be consistent with the underlying objective of the Northeastern Waterfront Plan to convert only waterfront property north of Market Street to non-maritime uses with the condition that maritime uses will be preserved and expanded along the southern waterfront./81/ This Alternative would convert port property adjacent to Piers 48 to 64 to non-maritime uses and would not allow for the expansion of maritime uses along the southern waterfront adjacent to the Project Area.

Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan. Alternative A would create a mixed-use residential neighborhood responding to the citywide goal to increase the supply of housing. This would relate to the future land use concept created under the Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan, as two mixed-use residential neighborhoods. Those three developments could reinforce each plan's objectives, in that residents and workers in each area would benefit from the community services and amenities of the other. In addition, open space uses proposed in South Beach near The Embarcadero (including the boardwalk fronting the China Basin Building) would connect with Alternative A open space to provide continuous public access to China Basin Channel.

South of Market Plan. Alternative A generally would reinforce the goals of the South of Market Plan by providing location options for activities that otherwise would compete for locations in South of Market, thus relieving development pressure on existing space and activities there (see VI.B. Land Use, Business Activity, and Employment, p. VI.B.110.) The location of Alternative A office space north of China Basin Channel would support development of the adjacent Service Secondary Office (SSO) district proposed in the plan. Alternative A would provide nearby residential options for South of Market workers, as well as open space amenities that could also serve South of Market.

Alternative B

Northeastern Waterfront Plan. Alternative B would create a mixed-use residential neighborhood compatible with similar uses proposed for the North China Basin subarea of the Northeastern Waterfront Plan. Recreation and open space under Alternative B would complement the proposed waterfront park and the recently completed South Beach marina north of the Project Area. Alternative B would extend MUNI light-rail service to connect the northern waterfront with the Project Area.

Alternative B would not be consistent with the underlying objective of the Northeastern Waterfront Plan to only convert waterfront property north of the Market Street to non-maritime uses with the condition that maritime uses will be preserved and expanded along the southern waterfront./81/ This Alternative would convert port property adjacent to Piers 62 to 54 to non-maritime uses and would not allow for the expansion of maritime uses along the southern waterfront.

Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan. As with Alternative A, Alternative B would create a mixed-use residential neighborhood consistent with redevelopment plans and the Rincon Hill Plan. Alternative B would provide for continuous public access along China Basin Channel which connects with the waterfront open space proposed in Rincon Point - South Beach. Since Alternative B and the Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan developments would respond to the citywide goal to increase housing, they would be compatible.

South of Market Plan. In contrast to Alternative A, Alternative B would include 3,600 dwelling units north of China Basin Channel, with retail space on King Street between Fourth and Fifth Streets. Although not in conflict with SSO district uses, housing-only north of the channel and along Townsend Street would create a distinct division between South of Market and Mission Bay. Alternative B would provide open space along both sides of China Basin Channel, accessible to residents and workers in

South of Market. That open space could help alleviate the area's deficit. With Alternative B, there would be more development pressure in the South of Market Area, thus making the South of Market Plan's goal to retain lower-rent-paying and existing businesses more difficult to achieve than with Alternative A; Alternative B would not offer alternate opportunities for businesses seeking South of Market locations.

Alternative N

Northeastern Waterfront Plan. Alternative N would be consistent with the plan's policy to focus maritime activities along the southern waterfront, freeing the northern waterfront for non-maritime uses. Alternative N would assume development of light industrial uses west of Third Street under current M-2 zoning and continued maritime and industrial uses east of Third Street. Alternative N also assumes that a new MUNI Metro light-rail line would connect the CalTrain station at Townsend and Fourth Streets to the northern waterfront.

Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan. Alternative N would not respond to the citywide goal to increase the City's housing supply. Alternative N would provide an open space strip on both sides of the channel. The Alternative would not provide new waterfront open space to connect with the proposed open space in the Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan area. Workers and area residents in Rincon Hill and South Beach could use the channel open space in Alternative N.

South of Market Plan. Alternative N would not directly affect the policies of the proposed South of Market Plan. There would be more development pressure for office uses from the South of Market than with Alternative A, but less than with Alternative B because office is a permitted use under existing M-2 zoning in the Project Area. The large amount of new M-2 Industrial space with Alternative N would relieve some pressure for lower-rent space in South of Market; Alternative N would thus cause less displacement pressure on the South of Market than would Alternative B. One block of office space would develop at Third and Townsend, thus partially relating to the adjacent SSO District in South of Market. Access to the channel open space from the South of Market would be impeded by existing train tracks west of Fourth Street. Less open space would be developed along the channel than in the other Alternatives to benefit South of Market residents and workers.

San Francisco Master Plan Elements

The relationship between the Mission Bay Alternatives and the objectives and policies of Elements of the Master Plan is summarized in Table VI.A.2. The table also references other sections of Chapter VI that address Master Plan issues. It is not expected that any of the Master Plan Elements would require amendments or revisions to accommodate any of the Alternatives.

Review and Approvals

San Francisco Planning Code and Zoning Map. Mission Bay Alternatives A and B would require amendments to the Master Plan, City Planning Code, and Zoning Map Amendments to the Master Plan are described under the Central Waterfront Plan, on p. VI.A.34-VI.A.43. To implement those Master Plan amendments, the City would develop Planning Code and Zoning Map amendments that would define new Use and Height and Bulk Districts to accommodate Alternatives A or B. Those amendments would ensure that objectives and policies set forth in a Special Area Plan for Mission Bay could be realized. The Master Plan changes would be adopted by the City Planning Commission. The Planning Code/Zoning Map amendments would be subject to City Planning Commission, Board of Supervisors and Mayoral action. In that process, all proposed changes would also be subject to public hearings. Alternative N, by definition the No-Project Alternative, would not require Master Plan amendments or rezoning.

The following discussion describes the type of Planning Code and Zoning Map changes that would be required for each Alternative. The existing Zoning Maps for the Project Area, which accommodate Alternative N, and maps characterizing possible Use and Height and Bulk Districts for Alternatives A and B are shown in Appendix A. The EIR Alternatives, Figures XIV.A.1-XIV.A.6, pp. XIV.A.4-XIV.A.9./82/ Table XIV.A.1, p. XIV.A.1, gives information on Use and Height and Bulk Districts, Floor Area Ratios, and open space requirements under existing zoning for Alternative N, as well as similar information assumed for analysis in this EIR for Alternatives A and B. Those maps and table do not contain proposed Planning Code and Zoning Map changes for Alternatives A and B; rather, they are provided to show the types of zoning changes that would be needed to accommodate Alternatives A and B. A variety of zoning solutions could accommodate Alternatives A and B. The Department would develop Planning Code and Zoning Map amendments for consideration by the City Planning Commission in concert with drafting a development agreement between the City and the project sponsor.

TABLE VI.A.2: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OBJECTIVES AND POLICIES OF THE SAN FRANCISCO MASTER PLAN

Objective or Policy	Alternative A	Alternative B	Alternative N
Commerce and Industry Element/a/			
Employment Policy 1: Promote attraction, retention and expansion of commercial and industrial firms which provide employment improvement opportunities for unskilled and semi-skilled workers.	Office, S/LI/RD, retail, hotel and other development would provide employment opportunities for unskilled and semi-skilled workers. About 25,000 total jobs would occur in the Project Area at build-out. Employment opportunities are discussed further in VI.B. Land Use, Business Activity and Employment, p. VI.B.83.	Office, S/LI/RD, retail and other development would provide employment opportunities for unskilled and semi-skilled workers; about 6,000 jobs would occur in the Project Area at build-out, about 19,000 fewer than under Alternative A. Employment opportunities are discussed in VI.B. Land Use, Business Activity and Employment, p. VI.B.83.	Development under M-2 zoning and office, retail and other development would provide employment opportunities for unskilled and semi-skilled workers. About 17,000 jobs would occur in the Project Area at build-out. About 8,000 fewer jobs would be provided than under Alternative A, but about 11,000 more than under Alternative B. Employment opportunities are discussed in VI.B. Land Use, Business Activity and Employment, p. VI.B.83.
Industry Policy 3: Avoid public actions that displace existing viable industrial firms.	Master-planned development of Mission Bay, with amendments to the Master Plan and zoning ordinances, would allow development of a new mixed-use neighborhood, displacing existing wholesale/distribution/warehouse, transportation-related and construction-related firms. Business transition, displacement and relocation are discussed in VI.B. p. VI.B.93.	Same as Alternative A.	Development under existing zoning would result in the least overall business transition in Project Area. Some businesses in new M-2 space would be similar to those currently in the Project Area. Businesses that could pay higher space costs could remain, while others would relocate. Business transition, displacement and relocation are discussed in VI.B. p. VI.B.93.
Industry Policy 5: Avoid encroachment of incompatible land uses on viable industrial activity.	Mission Bay development would introduce residential uses near existing transportation and related services, wholesale/distribution/warehouse and manufacturing, and construction related uses with which there could be potential incompatibility.	Same as Alternative A.	Because no new housing is expected, introduction of incompatible land uses into industrial areas is unlikely.
Maritime Policy 4: Avoid actions which may serve to displace desired existing maritime uses.	Development of Mission Bay would displace existing maritime and maritime-related uses except for backland and storage uses in the 6.5-acre area east of Third Street the designated "Port-related." That issue is discussed in VI.B. p. VI.B.101.	Development of Mission Bay would displace existing maritime and maritime-related uses. See VI.B. p. VI.B.101.	Development under existing zoning may over time replace existing maritime-related uses west of Third Street. Since the area east of Third Street would continue to be a Port Priority area, maritime and maritime-related activities similar to existing uses would continue. See VI.B. p. VI.B.101.

(continued)

TABLE VI.A.2: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OBJECTIVES AND POLICIES OF THE SAN FRANCISCO MASTER PLAN (continued)

Objective or Policy	Alternative A	Alternative B	Alternative N
Neighborhood Commercial Policy 1: Ensure and encourage the retention and provision of neighborhood-serving goods and services in the City's neighborhood commercial district, while recognizing and encouraging diversity among the districts.	All proposed retail would be neighborhood-serving. Neighborhood commercial areas would include residential/retail and office/retail buildings or would be located adjacent to residential uses. Those areas could include businesses that cater to a clientele from beyond the immediate neighborhood, but they would serve primarily the retail and service needs of local residents and workers. Retail activity is discussed in VI.B. p. VI.B.104.	Same as Alternative A.	Although development would include retail uses, they would not be primarily residential-serving, as new housing would not be provided. Retail uses would serve local employees and could also draw on a larger market area. Retail activity is discussed in VI.B. p. VI.B.104.
Residence Element/b/			
Housing Supply Policy 2: Facilitate the conversion of underused industrial and commercial areas to residential use.	Development would convert existing under-used industrial areas to a new mixed-use neighborhood, including 7,700 housing units. Housing is discussed further in VI.C. Housing and Population, p. VI.C.64.	Development would convert existing under-used industrial areas to a predominately residential neighborhood with 10,000 housing units. Housing is discussed further in VI.C. p. VI.C.64.	Industrial and commercial areas would not be converted to residential use.
Housing Affordability Policy 3: Seek inclusion of low- and moderate-income units in new housing development.	Thirty percent of new housing units in Mission Bay would be assumed to be affordable to middle- and moderate income households as defined in the Mayor's letter. Housing affordability is discussed in VI.C. p. VI.C.69.	Same as Alternative A.	NA. No new housing would be provided.
Community Facilities Element, Plan for Neighborhood Center Facilities/c/			
Objective 1, Policy 1: Provide neighborhood centers in areas lacking adequate community facilities.	About 2.4 acres of land for community facilities could include uses such as a school, police station, firehouse and/or a neighborhood center or other areas.	About 5.6 acres of land for community facilities could include a neighborhood center or other public uses.	About one acre of land for community facilities could be a fire station or police station. Because new housing would not be provided, this land would not be needed for a neighborhood center.

(continued)

TABLE VI.A.2: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OBJECTIVES AND POLICIES OF THE SAN FRANCISCO MASTER PLAN (continued)

<table>
<tr><th>Objective or Policy</th><th>Alternative A</th><th>Alternative B</th><th>Alternative N</th></tr>
<tr><td>Community Facilities Element, Police Facilities Plan/d/</td><td></td><td></td><td></td></tr>
<tr><td>Objective 1, Policy 2: Provide the number of district stations that balance service effectiveness with community desires for neighborhood police facilities.</td><td>About 2.4 acres of land for community facilities could include police facilities, if appropriate. Need for police facilities is discussed in VI.D. Community Services and Infrastructure, p. VI.D.43.</td><td>Same as Alternative A, except that 5.6 acres would be provided for community facilities.</td><td>Same as Alternative A, except that about one acre would be provided for community facilities, and it is likely that the site would be needed for fire protection services.</td></tr>
<tr><td colspan="4">Transportation Element/e/</td></tr>
<tr><td colspan="4">The Transportation Element presents objectives and policies concerning mass transit, vehicle circulation, pedestrian circulation, bicycle transportation, transportation and transit in the downtown, and parking. Those issues are addressed in several sections of VI.E. Transportation pp. VI.E.43-VI.E.49, and pp. VI.E.190-197.</td></tr>
<tr><td colspan="4">Urban Design Element/f/</td></tr>
<tr><td colspan="4">The Alternatives are compared to the policies of the Urban Design Element in VI.I. Architectural Resources and Urban Design, Table VI.I.2, p. VI.I.19.</td></tr>
<tr><td colspan="4">Recreation and Open Space Element/g/</td></tr>
<tr><td colspan="4">The relationship between open space and recreation features of the Alternatives and policies from the Recreation and Open Space Element are summarized in VI.D. Community Services and Infrastructure, Table VI.D.19, p. VI.D.87.</td></tr>
<tr><td colspan="4">Environmental Protection Element/h/</td></tr>
<tr><td colspan="4">The Environmental Protection Element Plan for Conservation sets forth broad objectives and policies concerning the "conservation, utilization and development of San Francisco's natural resources." The quality of the Bay, ocean and shoreline is discussed in VI.L. Hydrology and Water Quality, p. VI.L.6. Air quality is discussed in VI.F. Air Quality, p. VI.F.3; water demand in VI.D. Community Services and Infrastructure, p. VI.D.100; land and open space resources, in VI.D. Community Services and Infrastructure, p. VI.D.61; soils in VI.K. Geology and Seismicity, p. VI.K.2; and flora and fauna in VI.M. Vegetation and Wildlife, beginning on p. VI.M.7. The Transportation Noise Control Plan of the Environmental Protection Element is discussed in VI.G. Noise, p. VI.G.8.</td></tr>
<tr><td colspan="4">Energy Element/i/</td></tr>
<tr><td colspan="4">The Energy Element is discussed in VI.H. Energy, p. VI.H.5.</td></tr>
<tr><td colspan="4">Community Safety Element/j/</td></tr>
<tr><td colspan="4">Potential seismic hazards of the Project Area are discussed in VI.K. Geology and Seismicity, p. VI.K.11. Damage to infrastructure affecting emergency response capability is discussed in VI.K. Geology and Seismicity, p. VI.K.35; emergency responses are discussed in VI.D. Community Services and Infrastructure, Fire Protection, p. VI.D.32; Police Protection, p. VI.D.41; and Public Health, p. VI.D.93.</td></tr>
</table>

(continued)

TABLE VI.A.2: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OBJECTIVES AND POLICIES OF THE SAN FRANCISCO MASTER PLAN (continued)

NA - Not applicable.

/a/ Commerce and Industry Element, adopted by the City Planning Commission, Resolution 8001, June 29, 1978.
/b/ Residence Element, adopted by the City Planning Commission, Resolution 10045, June 28, 1984.
/c/ Neighborhood Center Facilities Plan, adopted by the City Planning Commission, Resolution 7646, January 20, 1977.
/d/ Plan for Police Facilities, adopted by the City Planning Commission, Resolution 7233, August 24, 1974.
/e/ Transportation Element, adopted by the City Planning Commission, Resolution 6834, April 27, 1972; Resolution 7647, January 20, 1977; Resolution 9434, June 24, 1982; and Resolution 10164, November 29, 1984.
/f/ Urban Design Element, adopted by the City Planning Commission, Resolution 6745, August 26, 1971.
/g/ Recreation and Open Space Element, adopted by the City Planning Commission, Resolution 11065, July 9, 1987.
/h/ Environmental Protection Element: Plan for Conservation, adopted by the City Planning Commission, Resolution 7020, May 24, 1973, Plan for Transportation Noise Control, adopted by the City Planning Commission, Resolution, 7244, September 19, 1974.
/i/ Energy Element, adopted by the City Planning Commission, Resolution 9409, June 3, 1982.
/j/ Community Safety Element, adopted by the City Planning Commission, Resolution 7241, September 12, 1974.

SOURCE: Environmental Science Associates, Inc.

The City Planning Commission and Board of Supervisors would make findings regarding the consistency of the development agreement with the eight Proposition M Priority Policies (see p. VI.A.13). Development under Alternative N would also require findings regarding consistency with the Priority Policies. Office space proposed in Mission Bay could also fall under the annual 950,000-square-foot limit established by Proposition M, and would compete with other projects for allocation of that limit. However, for purposes of analysis this EIR assumes that Mission Bay would proceed under a voter-approved exemption from the Proposition M annual office limit. This is a conservative scenario that assumes that development in Mission Bay would proceed without regard for the annual office space limit, i.e., the full effects of Mission Bay office development would occur by build-out/2020. Appendix B, Land Use, Business Activity, and Employment, describes how Proposition M limits were incorporated in economic forecasts for Mission Bay Alternatives.

Alternative A. Alternative A would create a mixed-use residential neighborhood in an area that is presently zoned for industrial activity. The current M-2 (Heavy Industrial) Use District would be replaced with a variety of zoning districts. In general, the Project Area would be rezoned for residential, commercial, industrial and open space uses. The zoning changes required to accommodate Alternative A would change substantially the nature and character of the Project Area from a relatively low-density industrial and maritime district to a mixed-use residential district with employment-generating and open space uses. The impacts of these zoning changes are discussed in VI.B. Land Use, Business Activity and Employment. Alternative A would have varying height limits, with a maximum height limit of 110 feet; height and bulk characteristics and their visual impacts for each Alternative are discussed in VI.I. Architectural Resources and Urban Design, pp. VI.I.26–VI.I.51.

Alternative B. New residential and open space zoning Districts would be required for Alternative B. The Project Area would change into a predominantly residential neighborhood with citywide open space resources and limited retail and employment-generating uses. Land use impacts associated with zoning changes are discussed in VI.B. Land Use, Business Activity and Employment, pp. VI.B.81–VI.B.83. Heights under Alternative B would vary, with a maximum height limit of 110 feet.

Alternative N. Under Alternative N, the existing M-2 zoning would remain in place. The zoning districts would be the same as those described in Setting, p. VI.A.14, and

Table XIV.A.1, p. XIV.A.1, and shown on Figure XIV.A.5, p. XIV.A.8. All uses except residential and certain highly noxious or dangerous uses are allowed under M-2 zoning as Principal Uses; residential uses are allowed with Conditional Use authorization. By retaining existing zoning, the Project Area would not undergo any substantial change of use; however, the area, which is underused, would be expected to develop with more-intense types of light industrial and other business activity (see VI.B. Land Use, Business Activity and Employment, pp. VI.B.100). Portions of the Project Area under Alternative N would have height limits from 50 to 200 feet under existing zoning. Therefore, heights under Alternative N could exceed height limits proposed under Alternatives A and B by about 90 feet in some places. However, the majority of development under Alternative N is expected to be low-rise buildings, averaging 40 feet in height; the corner block at Townsend and Third, which is presently zoned C-M, could develop with 105-foot-high office buildings.

San Francisco Health Code. Under all Alternatives, future development in the Project Area would comply with Ordinance No. 253-86, Section 1001, Public Works Code which requires a site history and soils analysis for proposed new construction in portions of the City suspected of being contaminated by hazardous wastes (see description of this ordinance on p. VI.A.15). Under all Alternatives, light-industrial uses (such as M-2 Industrial, Rail, Port-Related/M-2, and S/LI/RD) would be required to comply with city regulations related to storage, use, and disposal of hazardous materials, and maintenance and monitoring of underground storage tanks.

Site sampling required under that ordinance may result in discovery of hazardous waste deposits in the Project Area. In such circumstances, building permits for the affected areas would be issued only after a mitigation plan addressing the wastes has been approved by DOHS and RWQCB and implemented by the developer, and appropriate certifications submitted to the City (see VI.N. Hazardous Wastes, pp. VI.N.3-VI.N.4.

Port of San Francisco

Most land east of Third Street in the Project Area is under the jurisdiction of the Port of San Francisco and designated as Port Priority Use in the San Francisco Bay Plan and BCDC / MTC Seaport Plan (see Figure VI.A.3, p. VI.A.17). Both the Port and BCDC / MTC have designated that area for expansion of maritime uses and as backland/2/ for a near-term marine terminal development site (see pp. VI.A.19).

Cargo-handling in the Bay Area has not increased as fast as projected by the Seaport Plan six years ago and, therefore, the Seaport Plan's 1982 forecast of cargo growth now seems overly optimistic./83/ The Department of City Planning and the Port have investigated consolidating future container terminal development between Piers 70 and 80, south of Mission Bay. This consolidation, if approved by the Port and MTC / BCDC, would free Piers 48 to 50 for possible development of non-container terminal. Backland adjacent to those piers would then be potentially available for non-maritime use, such as those proposed with Mission Bay.

Near- and long-term marine terminal development sites represent the areas where the Port of San Francisco and BCDC/MTC believe terminal expansion could occur in the future, although such locations are not completely port-owned. Seaport Plan policies call for local governments and ports to protect such land for port use through zoning controls. The Seaport Plan assumes that such sites would be available for port use through negotiated acquisition or condemnation. If near-term terminal sites were proposed for non-maritime uses and required redesignation, complete review of the Seaport Plan would likely result. Such a review might be avoided if another near-term site of equivalent capacity were available; according to the Seaport Plan, that exchange would be desirable to ensure that the region could then accommodate its projected regional cargo handling demand. Alternatively, redesignation of sites could occur as a part of the current Seaport Plan amendment process, expected to be completed during 1988./84/

Privately owned parcels now owned by SFP between port property at Piers 70 and 80 and the former Western Pacific ferry slip are the only lands available for transfer of Near-Term development sites./84/ Although the Port has expressed interest in a land exchange, it cannot be assumed in this EIR that the exchange would occur./85/ Therefore, the following assumes that the Port would continue to pursue development of Piers 48 to 64 (referred to as the Mission Rock Container Terminal) as a marine container terminal requiring backland east of Third Street. (The Mission Rock Container Terminal described in port plans encompasses Piers 48 to 64. It would include Piers 48 to 50, designated in the Seaport Plan as Active Terminal sites, and Piers 52 to 64, designated as Near-Term development sites.)

Mission Bay would not directly affect the Port's current capital improvement plans for modernizing and upgrading existing container terminal operation on Piers 80 to 96 south of the Project Area. If implemented, those proposed improvements would meet the

Seaport Plan's recommendation to expand and modernize existing cargo-handling facilities before developing near-term sites. The improvements would not affect near-term designation for Piers 52 to 64 or Pier 70 near Mission Bay. VI.B. Land Use, Business Activity, and Employment, pp. VI.B.101-VI.B.104 discusses effects of each Alternative on existing and future port land uses.

Alternative A

Alternative A would not respond to port plans and policies to expand maritime activities and develop the Mission Rock Container Terminal adjacent to the Mission Bay Project Area. Alternative A would not respond to the policies of the Conceptual Maritime Master Planning for Southern Waterfront (Maritime Master Plan). Uses proposed east of Third Street under Alternative A would require complete revision of the Seaport Plan and subsequent amendments to remove Piers 52 to 64 from designation as a Near-Term marine container terminal development site and remove Port jurisdiction and Port Priority Use designations east of Third Street.

Mission Bay land uses east of Third Street would not directly displace existing maritime activity on Piers 48, 50 and 54 adjacent to the Project Area; proposed uses would limit expansion of cargo-handling capabilities on land under port jurisdiction. Proposed uses could also inhibit the reestablishment of maritime activities. For example, if a pier adjacent to the Project Area were removed as a result of a fire on the piers or other structural failure, it could be difficult for the Port to reestablish maritime activities once housing and open space were developed in the Port Priority Use area. Incompatibility between residential uses and intensified maritime uses would likely make it difficult for the Port to intensify maritime activities on Port land adjacent to the site.

Port policies would allow for interim uses on port property east of Third Street. An interim use must not be financially, physically or psychologically irreplaceable or must be readily moveable or replaceable should the Port desire to develop the property for maritime purposes./85/ With Alternative A housing, S/LI/RD and open space east of Third Street would not be acceptable interim uses according to the Port./85/ East of Third development, however, would not affect city policies to further develop Agua Vista Park east of Illinois Street between Mariposa and 16th Street or to relocate small-boat launching ramps and yacht clubs.

Alternative A would not respond to port policies to develop the Mission Rock Container Terminal as called for by the Maritime Master Plan; the 6.5 acres planned for Port-related uses east of Third Street would be insufficient to support a marine container terminal, and the predominant land use of housing and open space would be generally incompatible with an adjacent terminal operation. The 17 acres of open space at Pier 62 in Alternative A would include land designated as part of the container terminal in the Maritime Master Plan. Most of the land designated as open space for Agua Vista Park in the Maritime Master Plan would be S/LI/RD space in this alternative; that proposed use therefore would not be consistent with the Port's policy to expand that open space.

The Seaport Plan also includes transportation policies for port property east of Third Street. Near- and Long-Term marine terminal development sites have been designated as such because they would require a minimum of investment in new rail and truck access infrastructure. Alternative A would maintain rail access to port property at existing levels, but would remove excess tracks east and west of Third Street. If the Port developed the Mission Rock Container Terminal as a container terminal, rail tracks removed under Alternative A would have to be rebuilt to serve the new terminal. Thus, Alternative A would not respond to the Seaport Plan's policy to maintain freight access to marine terminal sites. VI.E. Transportation, pp. VI.E.20-VI.E.25, discusses existing rail freight service in the Project Area.

Alternative B

Effects of Alternative B would generally be similar to those of Alternative A, although, as a primarily residential community, Alternative B could result in more land use and compatibility conflicts related to maritime operations on adjacent piers. Alternative B would locate about 2,300 dwelling units adjacent to Piers 50 to 52, and some S/LI/RD space east of Third Street, and would not provide land in the Project Area for port-related uses. Alternative B would require revision of the Seaport Plan and BCDC's Bay Plan and San Francisco Special Area Plan to remove port-priority designation. Alternative B would not respond to the Maritime Master Plan policies to expand maritime activities east of Third Street.

As with Alternative A, Alternative B would preclude development of the Mission Rock Container Terminal. Alternative B would allow continued maritime use of the piers adjacent to the Project Area. Alternative B would provide public access to the waterfront on the south side of China Basin Channel, east of Third Street, and south of Pier 54, which is designated as part of the container terminal in the Maritime Master Plan.

Alternative B would not respond to transportation access policies of the Seaport Plan: rail access to the waterfront would be maintained, but would not be adequate for container terminal operations.

Alternative N

Alternative N would be consistent with the port policies as it would assume no major changes in land use east of Third Street. Alternative N would permit future development of the Mission Rock Container Terminal. Existing rail access and tracks would remain and could serve a future container terminal adjacent to the Project Area as called for by the Seaport Plan.

No open space east of Third Street or public access to the Bay would be expected to be developed under this Alternative. Five acres of passive open space is expected to be developed along the channel. Alternative N would not respond directly to port objectives to develop recreational resources along the waterfront.

REGIONAL AGENCIES

San Francisco Bay Conservation and Development Commission

San Francisco Bay Conservation and Development Commission (BCDC) plans that guide development along San Francisco Bay include the Bay Plan, San Francisco Waterfront Special Area Plan, the San Francisco Waterfront Total Design Plan, and the Seaport Plan. The overall goal of the McAteer-Petris Act and connecting thread among all those plans is to limit unnecessary filling of the Bay. BCDC's permit jurisdiction extends only to the landward edge of the 100-foot shoreline band. The area designated Port Priority Use extends further landward of the shoreline, generally to Third Street (see Figure VI.A.3, p. VI.A.17). BCDC has review and comment authority over the area between the 100-foot band and the boundary of the Port Priority Use area. BCDC would request that development in this area be consistent with all BCDC policies and not preclude continued or future use of the areas within the 100-foot band for maritime uses. If any federal funding were involved or federal approval were required for development of Mission Bay within the Port Priority Use area, federal law would require development to be consistent with all BCDC plans to the maximum extent possible. It is not known whether development of Mission Bay would involve federal funding.

BCDC's main concerns regarding the Mission Bay focus on 1) the project's potential land use conflicts with Seaport Plan and Bay Plan policies for Port property and container terminal site designations; 2) filling and dredging in the Project Area; and 3) public access to China Basin Channel and the waterfront./86/ Mission Bay would require a BCDC permit for the placement of any Bay fill or dredging and any change of use of land and structures within BCDC Bay or shoreline jurisdiction (see Permits, pp. VI.A.66-VI.A.68).

In general, BCDC's policies cover Port activities, public access to the Bay, and marsh and wetlands creation and maintenance along the Bay. BCDC's Total Design Plan and Public Access Supplement policies are discussed in Table VI.D.19, pp. VI.D.90-VI.D.91. Bay Plan policies on marsh and wetlands are discussed in VI.M. Vegetation and Wildlife, p. VI.M.12; policies on water quality and dredging activities are discussed in VI.L. Hydrology and Water Quality, p. VI.L.27. BCDC policies discussed below are generally concerned with Port activity as defined by the Seaport Plan. Project consistency with the Seaport Plan is also discussed under the Port of San Francisco, pp. VI.A.53-VI.A.55.

Alternative A

Alternative A would require a BCDC permit for dredging activities in China Basin Channel assumed for this Alternative (see VI.L. Hydrology and Water Quality, p. VI.L.27). Because the channel would remain tidal, it would be under BCDC's jurisdiction. BCDC also would have permit jurisdiction over the open space along the channel and Bay waterfront within the 100-foot shoreline band. Alternative A would provide about 19 acres of open space along the channel, which would respond to BCDC public access policies. The Alternative also would include a park east of Third Street at Pier 62 extending south to Mission Rock Street; a strip of open space would buffer Port-related uses from the proposed housing east of Third Street.

Most of the land east of Third Street is Port Priority Use in the BCDC/MTC Seaport Plan, the Bay Plan and the San Francisco Waterfront Special Area Plan. Alternative A would not be consistent with Port Priority Use designation because uses proposed east of Third Street, (residential, open space and S/LI/RD) are not allowed under this designation.

Alternative A would provide 6.5 acres for Port-related uses between Piers 50 and 54, which would continue to provide support for existing maritime uses on Piers 48 and 64, but would not be sufficient to support a container terminal at Piers 48 to 50, as recommended by BCDC. Development of non-maritime uses on land designated as Port Priority Use could cause pressure for additional Bay fill along the waterfront east of Third Street in order to accommodate future Port expansion./87/ The underlying purpose of the Port Priority Use designation is to ensure that future Port expansion will not require additional Bay fill. Although BCDC has no permit authority over the area outside the 100-foot band, it would oppose development of housing and S/LI/RD uses on Port Priority Use land./87/ Alternative A would require revision of BCDC's Bay Plan and Seaport Plan to remove Near-Term status from piers adjacent to the Project Area and to remove Port Priority Use designations east of Third Street.

Alternative B

Alternative B would include about 20 acres of wetlands in addition to housing and S/LI/RD uses east of Third Street in areas designated by BCDC for Port Priority Use. As with Alternative A, housing and S/LI/RD uses under Alternative B would be inconsistent with BCDC's designation and would trigger revisions to the Bay Plan and Seaport Plan to accommodate those non-maritime uses. All Alternative B wetlands would be excavated or "dry dredged." Excavation within the 100-foot shoreline band would require a BCDC permit; once established, the new wetlands would be under BCDC permit jurisdiction (see VI.L. Hydrology and Water Quality, p. VI.L.30.)

Alternative N

Alternative N would not include dredging of the China Basin Channel and would not require a BCDC permit. Maritime uses would be expected to expand east of Third Street under this Alternative, which would be consistent with the Port Priority Use designation. Because Alternative N would include about five acres of passive open space along the channel, it would respond to BCDC's policy to provide continuous public access around the channel. The change of use to passive recreation in the 100-foot shoreline band would require a BCDC permit.

Metropolitan Transportation Commission

The preceding section discusses the Seaport Plan, jointly prepared by the Metropolitan Transportation Commission (MTC) and BCDC. In VI.E. Transportation, several MTC plans are reviewed to determine what highway, transit, maritime and rail freight improvements would likely be in place by the year 2000 and the year 2020 (see "Regional Transportation Facilities," p. VI.E.83). Those plans include the Regional Transportation Plan and Regional Transportation Improvement Program. The Alternatives are discussed in relation to MTC's policies for CalTrain on p. VI.E.191, "Plans and Policies Regarding CalTrain."

Regional Water Quality Control Board

The Regional Water Quality Control Board's (RWQCB) concerns about Mission Bay focus on three issues: 1) effects on existing sewer capacity that could increase the number of overflows to the Bay during storms; 2) potential for groundwater contamination from hazardous materials present from previous industrial uses on the site; and 3) potential impact of construction-related erosion and sedimentation on China Basin Channel./88/ The City's Clean Water Program has planned for about ten outfall overflows per year during heavy storms; this number of overflows is acceptable to the RWQCB./88/ RWQCB has expressed concern that the Mission Bay project at build-out would cause more than 10 overflows per year. Those issues are discussed in VI.L. Hydrology and Water Quality, pp. VI.L.22-VI.L.23. RWQCB staff have stated that it is unlikely that any use proposed for the Project Area would require a water quality permit such as the National Pollution Discharge Elimination System (NPDES) permit that addresses discharges into state waters./88/ Sedimentation is addressed in VI.L. Hydrology and Water Quality, pp. VI.L.24. (As discussed on p. VI.A.70, and Table VI.A.4, p. VI.D.69, Corps of Engineers (COE) permits would be required for channel dredging in Alternative A. That Section 404 permit process would trigger RWQCB review and certification that proposed dredging activities would meet state water quality standards. Alternatives B and N would not require Corps of Engineers permits, nor that RWQCB action (see VI.L. Hydrology and Water Quality, pp. VI.L.25-VI.L.27.)

Hazardous Materials

The RWQCB has indirect responsibility for some hazards-related activities in the Project Area, including removal of underground storage tanks (USTs) and cleanup of hazardous wastes. Any necessary site mitigation affecting water resources must be approved and monitored by the RWQCB; in addition, the State Department of Health Services (DOHS) and San Francisco Department of Public Health (DPH) would be involved prior to development of the Project Area. USTs would be removed; as required by City ordinance, (administered by the City's Department of Public Health) the sites would be sampled for hazardous waste deposits. DPH also has a UST program that implements the requirements of state laws; any USTs found to be leaking would be reported to the RWQCB, as required by law. Mitigation plans prepared under the Hazardous Soils Analysis Ordinance for cleanup of any hazardous waste deposits would be reviewed and approved by the RWQCB prior to implementation.

Required permits, approvals, and agency notifications associated with businesses or operations that locate in Mission Bay would be the responsibility of industrial tenants or operators, rather than the project sponsor. The RWQCB maintains a list of registered USTs, as does DPH. Should new light-industrial uses (including S/LI/RD, M-2 Industrial, Port-Related/M-2, or rail uses) proposed under any of the Alternatives install new USTs, firms installing the USTs (who would obtain permits for such installations from the City) would be required to notify the RWQCB within 30 days.

The RWQCB would also be involved in approving and implementing site mitigation plans addressing other types of ground water contamination, besides that associated with USTs that might be identified in the Project Area. Potential deposits of hazardous materials and procedures for remedial action cleanup also are discussed in detail in VI.N. Hazardous Wastes, beginning p. VI.N.21.

Bay Area Air Quality Management District

Consistency of the Mission Bay project with the BAAQMD's Air Quality Plan is evaluated with respect to proposed transportation improvements, potential for violating air quality standards and consistency with the land use/demographic-growth assumptions of the plan. In general, Mission Bay would be consistent with the Air Quality Plan by emphasizing public transit for all Alternatives, and pedestrian and bicycle circulation for

Alternatives A and B, as described in VI.E. Transportation. Air Quality impacts and the 1982 Bay Area Air Quality Plan are further discussed in VI.F. Air Quality, p. VI.F.18.

STATE AGENCIES

State Lands Commission

Alternative A

Alternative A would include residential, S/LI/RD and open space uses on land that may be subject to the public trust. Public trust lands may be used for the state-wide public benefit, for maritime-related commerce, navigation, fishery-related uses, and recreational, and open space. Residential and non-maritime-related S/LI/RD uses are not acceptable uses under the public trust. The City and the State Lands Commission (SLC) are conducting studies to define the extent and location of those public trust lands. They are also investigating whether trust lands within the Project Area may be exchanged for other lands of equal or greater value which are more useful for public trust purposes. That would enable the release of parcels within the Project Area from the public trust conditions. This land exchange is discussed under Port of San Francisco (see p. VI.A.54) and V. The EIR Alternatives and Approval Process, p. V.42. The Port and SLC would determine if the public trust would be maintained by such a land exchange.

Alternative B

As with Alternative A, Alternative B would include residential, and S/LI/RD (which might not be maritime related) uses east of Third Street, which would not be acceptable uses for lands held in public trust. This Alternative would require exchanging lands of equal or greater value elsewhere along the waterfront for the public trust lands east of Third Street. The City, Port and SLC would determine if the public trust would be maintained by such a land exchange.

Alternative N

Alternative N would not change uses east of Third Street and would not require a land exchange. Thus, SLC would have no jurisdiction over this Alternative.

California Public Utilities Commission. Under Alternatives A and B, the existing CalTrain terminal at Fourth and Townsend Streets would be closed, CalTrain tracks would be removed from Fourth and Townsend Streets to approximately Seventh and Channel Streets and a new CalTrain terminal would be built at Seventh and Channel. Those actions would constitute a change in CalTrain service and therefore would require approval by the California Public Utilities Commission (CPUC). CalTrans, as operator of the CalTrain service, would be required to submit a formal CPUC application requesting the changes and file a public notice of the changes. Although not required, the CPUC could conduct a public hearing on the proposal./89/

Alternatives A and B would change the freight rail network near the Project Area. Those changes which would require CPUC approval are described in VI.E. Transportation on p. VI.E.153 (year 2000) and p. VI.E.178 (year 2020). Alternative N would not require CPUC approval because it would not change the freight rail network./90/

California Department of Transportation. VI.E. Transportation, p. VI.E.210, assesses the relocation of the CalTrain Station from Fourth and Townsend to Seventh and Channel under Alternatives A and B and retention of the station at Fourth and Townsend Streets under Alternative N, against the policies and objectives of CalTrans' five-year Short Range Transportation Plan. In addition, VI.E. Transportation, "Regional Transportation Facilities and Services," p. VI.E.190, discusses the removal of the I-280 freeway stub and the design of new ramps at Sixth Street as proposed under all Alternatives.

California Department of Fish and Game. VI.M. Vegetation and Wildlife, pp. VI.M.7–VI.M.20, discusses vegetation and wildlife impacts of the Alternatives. In general, the California Department of Fish and Game (CDFG) would not have any policy concerns about wildlife and wildlife habitat in and near the Project Area. Reconfiguration of the channel as a result of dredging assumed under Alternative A could require a Section 1601-03 Stream Alteration Agreement. Generally, CDFG only decides if a project requires a Section 1601-03 permit after reviewing the project EIR. CDFG would also review and comment on the COE Section 404 permit required for dredging (see Permits, p. VI.A.86). Alternatives B and N would not include any wet dredging or reconfiguration to the China Basin Channel and, therefore, would not require a Stream Alteration Agreement or COE Section 404 permit./91/

Department of Health Services

The State Department of Health Services (DOHS) would be the agency overseeing treatment, containment, removal, transportation, and disposal of any hazardous wastes found on the site under the state's Hazardous Waste Control Law (HWCL). Prior to development, the project sponsor would investigate the Project Area for the presence of hazardous wastes, as required by City Ordinance No. 253-86. Should any hazardous waste deposits be discovered in the Project Area, the project sponsor would prepare a Remedial Action Plan for cleanup of the wastes. This plan would require review and approval by DOHS prior to implementation. Required permits and approvals associated with businesses that locate in Mission Bay would be the responsibility of industrial tenants or operators, and not the developer. Appendix L. Hazardous Wastes, presents a detailed discussion of applicable laws and regulatory review addressing hazardous wastes beginning on p. XIV.L.1.

FEDERAL AGENCIES

U.S. Army Corps of Engineers

VI.L. Hydrology and Water Quality, evaluates how the Alternatives comply with COE regulations for dredging (see p. VI.L.25), and transportation and disposal of dredged materials in U.S. waters (see p. VI.L.27). The COE would require Section 404 and Section 10 permits for Alternative A; Alternatives B and N would not require any COE permits. COE permit requirements are discussed below (see Permits, p. VI.A.70).

U.S. Coast Guard

The U.S. Coast Guard has jurisdiction over China Basin Channel as a navigable waterway. The addition of a new bridge across the channel at Owens Street in Alternatives A and B, would require a Coast Guard bridge permit (see Permits, p. VI.A.71)./92/ In Alternative B, a bridge would be constructed across the tidal outlet of the wetlands south of Pier 54 to retain China Basin Street and adjacent railroad tracks. Because it would retain an existing street, the bridge would not require a Coast Guard bridge permit./93/ The three wetlands in Alternative B would alter the shoreline. Although the Coast Guard would not require that additional aids to navigation be provided due to those alterations, it may recommend that aids to navigation, such as lights and markers, be included as part of approving a development agreement for the entire Project Area. The Coast Guard would require that those aids be designed according to federal regulations (33 CFR 66) and approved by the Coast Guard through a Private Aids to Navigation Application./93/

U.S. Fish and Wildlife Service

VI.M. Vegetation and Wildlife, pp. VI.M.7-VI.M.20 discusses fish and wildlife habitat impacts in and around the Project Area. The U.S. Fish and Wildlife Service (USFWS) would comment on the COE permit application for Alternative A, regarding any potential impacts from dredging to fish and wildlife, including damage to habitats. It is not expected that USFWS would have major concerns about the dredging, as the channel offers limited habitat resources and there are no threatened, rare or endangered species in the area. USFWS would support and have interest in the new wetlands proposed with this Alternative. As with CDFG, USFWS would not have any formal authority over the wetlands creation; however, they would have jurisdiction over the wetlands once established.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) main concern regarding Mission Bay is water quality in China Basin Channel and its effect on the herring spawning grounds just outside the mouth of the channel. Over the last few years herring spawning grounds have shifted from the northeast part of the Bay to the southwest part of the Bay near the Project Area; consequently this spawning ground has become increasingly important to the species. Dredging of the channel for Alternative A would release additional fine sediment into the water, which could suffocate herring eggs during the December through March spawning season; adult herring could also suffer gill damage (see VI.M. Vegetation and Wildlife, pp. VI.M.14-VI.M.15)./94/

PERMITS

This section defines agency approvals that would be required for the development agreement or overall master plan for the Project Area as well as subsequent permits that would be required by various phases of development. Most agencies previously discussed do not have authority over adopting a development agreement for Mission Bay. However, some may have permit requirements later on for specific uses which could locate in the

Project Area after construction. These types of use-related permits would be applied for by the actual tenant or owner of a specific business.

Local Agencies

City and County of San Francisco

Mission Bay would require a wide variety of local City permits from the City's public service agencies at different stages of the development process. Those permit requirements are summarized in Table VI.A.3. The approval process for the project, including city permits, are also discussed in V. The EIR Alternatives and Approval Process, pp. V.40-V.41.

Regional Agencies

Table VI.A.4, p. VI.A.69, discusses permit requirements for each Alternative.

Bay Conservation and Development Commission

Any alteration of the Bay shoreline (e.g., dredging, creation of wetlands) would require a preliminary permit application for BCDC consultation. The final application would include a description of the work proposed, a list of local and other approval agencies and their requirements, the certified Environmental Impact Report analyzing the proposed changes, a response to specific questions addressing project details and justification, and exhibits, including entire project plans drawn to scale, and maps depicting BCDC jurisdiction within the Project Area. BCDC is unlikely to approve a permit application without detailed development plans or blue prints. Since the Mission Bay project is currently at a conceptual stage, BCDC could require a series of permit applications. The first permit application would cover the overall master plan for the Project Area as defined by the project sponsor and the City under the development agreement. As project phases are developed, BCDC could require supplemental permits for each phase of development.

BCDC's permit jurisdiction does not extend into Port Priority Use areas east of Third Street beyond the 100-foot shoreline band. As discussed on p. VI.A.58, development of non-maritime uses on Port Priority Use land would constitute a policy impact but would not require a permit./95/ Within the Project Area, only a small portion of the land around

TABLE VI.A.3: SUMMARY OF SAN FRANCISCO AGENCY AUTHORITY, MISSION BAY

Agency	Permit or Review Authority
Department of City Planning	Prepares EIR and project plan and draft development agreement; develops City Planning Code text, Zoning Map, and Master Plan amendments.
City Planning Commission	Certifies EIR; approves City Planning Code text, Zoning Map, Master Plan amendments, and Master Plan referral for street vacations and subdivision maps; reviews development agreement.
Board of Supervisors	Approves development agreement and City Planning Code and Zoning Map changes, street vacations and subdivision maps.
City Attorney	Reviews and enforces development agreement, and related administrative or legislative actions.
Mayor	Has final approval of Master Plan amendments and development agreement and Planning Code and Zoning Map amendments.
Bureau of Building Inspection	Issues site permit, building permits. Checks fire safety, building code compliance. Performs plan checks.
Department of Public Works and Department of Real Estate	Street vacation petitions, subdivision maps, roadway construction, utility locations, bridge operations. Reviews site histories and soil samples for hazardous materials prior to issuing building permits.
Department of Public Health	Issues permits for certain uses, such as food establishments, bars, laundries. Reviews site histories and soil samples for hazardous materials prior to issuing building permits. Regulates presence and removal of underground storage tanks and disposal of hazardous materials.
Fire Department	Reviews and comments on street closings or vacation and street widths and design; reviews building plans for fire safety concerns. Issues permits for underground storage tanks. Inspects for proper storage of hazardous materials.

(continued)

TABLE VI.A.3: SUMMARY OF SAN FRANCISCO AGENCY AUTHORITY -- MISSION BAY (continued)

Agency	Permit or Review Authority
Police Department	Reviews and comments on street closing or vacations.
Parking Authority	Constructs and operates public parking garages; administers funds for new parking meters.
Public Utilities Commission	Reviews new or revised transit routes, utility locations.
Recreation and Park Commission	Reviews proposed buildings over 40 feet for potential shadow impacts on Recreation and Park Department open space, where applicable.
Port of San Francisco	Site permits, building permits, fire safety, building code compliance, plan checks for all Port-owned and private property in Port jurisdiction.

SOURCE: Environmental Science Associates, Inc.

Pier 62 is within BCDC's 100-foot shoreline band. As Figure VI.A.3, p. VI.A.17, shows, the Project Area extends only to the western edge of China Basin Street.

State Agencies

Table VI.A.4, p. VI.A.69 discusses permit requirements for each Alternative.

California Department of Transportation

Caltrans requires that all proposed construction located within, under, or over State highway right-of-way be covered by a Caltrans encroachment permit. Caltrans reviews all such proposals to ensure that they are compatible with the primary uses of the State highway system, and to ensure highway safety and to protect the State's property investment in the highway facility./96/

TABLE VI.A.4: REQUIRED REGIONAL, STATE AND FEDERAL AGENCY PERMITS FOR MISSION BAY, BY ALTERNATIVE

Agency and Permit	Alternative A	Alternative B	Alternative N
Bay Conservation and Development Commission (BCDC) Permit	Alternative A would require a BCDC permit for dredging activities in China Basin Channel and for public access/open space proposed along the channel and Pier 62. This Alternative proposes only open space uses within the 100-foot shoreline band, which would respond to BCDC policies for public access.	The Alternative would involve dry dredging for the creation of three separate wetlands. BCDC would have permit jurisdiction over these areas once established and permit jurisdiction in the 100-foot shoreline band. Alternative B proposes only open space uses within the 100-foot shoreline band that falls within the Project Area. A BCDC permit would be required for public access and for excavation (for wetlands) within the 100-foot shoreline band.	Alternative N would not require a BCDC permit. This Alternative assumes either open space or maritime uses within the 100-foot shoreline band of BCDC jurisdiction (as well as maritime uses within the Port-Priority Use Area, outside their permit jurisdiction). Any change of use or structure within the shoreline band would require a permit.
Caltrans Encroachment Permit	Alternative A may require a permit to authorize construction of (1) new uses within Caltrans' air rights in the area between Third and Sixth Streets, currently occupied by the I-280 stub unless Caltrans sells or otherwise relinquishes those air rights; (2) street approaches or connections to I-280 at Sixth and King Streets/a/; (3) new extension of Owens Street south from 16th Street to Mariposa Street that may be located within or under Caltrans' I-280 right-of-way.	Same as Alternative A.	Same as Alternative A, except the permit would not cover item (3), extension of Owens Street within or under Caltrans' right-of-way, because that extension would not be proposed under Alternative N.
U.S. Army Corps of Engineers (COE) Section 10 and Section 404	Alternative A would include reconfiguration of China Basin Channel, which would include dredging about 265,000 cubic yards of materials from the channel. The removal of this material and its disposal would require a Section 404 permit; reconfiguration of the channel would require a Section 10 permit. It is not known which method of disposal, either land or water, or which site would be used for disposal of dredged materials. A disposal site would be chosen after required testing of materials.	Alternative B would not include dredging of the channel and therefore would not require a COE Section 404 and 10 permit./b/	Same as Alternative B.
United States Coast Guard Bridge Permit/c/	Bridge added across the channel at Owens Street would require a permit.	Same as Alternative A.	No permit required.

/a/ These new ramps are part of the I-280 Transfer Concept Program.
/b/ COE would not have jurisdiction over dry dredging activities for wetlands creation and thus a Section 404 permit would not be required; however, a permit could be required if the water table is too shallow, which would make it necessary to finish dredging in the wetland areas using wet-dredging techniques.
/c/ U.S. Department of Transportation, U.S. Coast Guard, Bridge Permit Application Guide, April 1985.

SOURCE: Environmental Science Associates, Inc.

In the Project Area, Caltrans maintains the I-280 right-of-way, including the air rights currently occupied by the I-280 stub between Third and Sixth Streets. Caltrans intends to convey those air rights in conjunction with removal of the stub. If they were conveyed, an encroachment permit would not be required for new uses in that area under all Alternatives. As summarized in Table VI.A. 4, p. VI.A.69, construction in other areas within or under State highway right-of-way may require an encroachment permit. One encroachment permit could cover several construction projects in the Project Area./97/

Federal Agencies

Table VI.A.4, VI.A.69, discusses permit requirements for each Alternative.

U.S. Army Corps of Engineers

The U.S. Army Corp of Engineers (COE) would require a Section 10 (River and Harbor Act) permit for any alteration of navigable waters and tidelands. A Section 404 (Clean Water Act) permit would be required for dredging in China Basin Channel and disposal of dredged spoils into U.S. waters. Under the Clean Water Act, the COE has jurisdiction over these activities with final approval by the Environmental Protection Agency (EPA). The COE must notify the EPA before issuing a permit and include a determination of the need for, or availability of, an Environmental Impact Statement.

Depending on the composition and quality of the materials to be disposed, dredged materials from the channel under Alternative A could be disposed of either on land, at the existing Alcatraz site, or at an ocean site yet undesignated by the COE and EPA./98/ The worse-case scenario would require disposal of dredged materials at a Class I hazardous materials disposal site. VI.L. Hydrology and Water Quality, pp. VI.L.25-VI.L.27, discusses the dredged materials standards for the disposal options. VI.N. Hazardous Wastes, starting on p. VI.N.1, discusses the hazardous materials and contamination levels for the entire Project Area.

The COE would require the project sponsor to submit a preliminary permit application after an alternative is chosen but before final project approval by the City. Based on this preliminary application, the COE would issue a jurisdictional determination. The project sponsor would then submit a formal "Application for a Department of the Army Permit." An Environmental Assessment on the permit would be prepared and circulated to other state and federal agencies to determine if an Environmental Impact Statement would be necessary. It is possible that the Mission Bay EIR could satisfy National Environmental Policy Act (NEPA) requirements or that a supplemental document would be required for topics not covered by the EIR. If the project's dredging and channel reconfiguration would cause significant environmental impacts, then the COE could also require a Section 404(b)(1) Alternatives Analysis to determine if the project is water dependent (i.e., is the dredging and channel reconfiguration essential to the project's viability).

United States Coast Guard

The United States Coast Guard (USCG) would require a permit for constructing a new bridge at Owens Street over the navigable waters of the United States./93/ A permit application would be submitted to the Coast Guard District Office showing the location and clearances proposed and describing construction plans. The USCG would then solicit comment from state and federal agencies, public interest agencies, and the maritime community and evaluate those comments together with their own investigation of navigation safety and environmental effects before deciding to issue or deny a bridge permit. As part of their decision process, the USCG will prepare an environmental document in accordance with NEPA. A determination as to whether the Mission Bay EIR would satisfy NEPA requirements or if supplemental environmental review is required would be made at the time permit applications are filed with the USCG.

NOTES

SETTING

/1/ San Francisco Department of City Planning, Central Waterfront Plan, adopted by the City Planning Commission, Resolution 8631, July 3, 1980.

/2/ Backland: Area inland from container cranes where containers can be stored.

/3/ San Francisco Department of City Planning, Northeastern Waterfront Plan, by the adopted City Planning Commission, Resolution 7643, January 31, 1980, Resolution 8596, May 29, 1980 and Resolution 8781, December 4, 1980.

/4/ San Francisco Department of City Planning, Rincon Hill Plan, adopted by the City Planning Commission, Resolution 10378, July 18, 1985.

/5/ San Francisco Redevelopment Agency, Rincon Point-South Beach Redevelopment Plan, adopted by the Board of Supervisors, Ordinance No. 14-81, January 5, 1981; and Ordinance No. 50-84, January 23, 1984.

/6/ San Francisco Redevelopment Agency, Yerba Buena Center Redevelopment Plan, originally adopted by the Board of Supervisors, Ordinance No. 98-66 April 25, 1966 and by subsequent amendments: Ordinance No. 201-71, July 26, 1971; Ordinance No. 393-73, October 9, 1973; Ordinance No. 386-77, September 13, 1976; Ordinance No. 367-77, August 8, 1977; Ordinance No. 420-79, August 13, 1979; and Ordinance No. 538-81, November 2, 1981.

/7/ San Francisco Department of City Planning, The Downtown Plan with related amendments to the San Francisco Master Plan, adopted by the City Planning Commission, November 29, 1984; adopted by the Board of Supervisors, September 10, 1985.

/8/ City Planning Code, Section 128, Transfer of Development Rights in C-3 Districts.

/9/ San Francisco Department of City Planning, South Bayshore Plan, adopted by the City Planning Commission, Resolution 6486, February 19, 1970; amendments adopted by City Planning Commission, Resolution 10458, October 17, 1985.

/10/ San Francisco Department of City Planning, South of Market Plan, Proposal for Citizen Review, June 1985. The proposal for Citizen Review, on which the EIR analysis is based, would permit office uses on portions of 12 blocks of a Service-Secondary Office (SSO) district along Townsend Street and Second Street. The Proposal for Adoption is likely to include an SSO district about half that size, with the area eliminated from the SSO district instead proposed for inclusion in the adjacent Service-Light Industrial (SLI) district in which office development would not be permitted. Susana Montana, San Francisco Department of City Planning, telephone conversation, April 7, 1988.

/11/ San Francisco Department of City Planning, Commerce and Industry Element, adopted by the City Planning Commission, Resolution 8001, June 29, 1978.

/12/ San Francisco Department of City Planning, Residence Element, adopted by the City Planning Commission, Resolution 10045, June 28, 1984

/13/ San Francisco Department of City Planning, Transportation Element, adopted by the City Planning Commission, Resolution 6834, April 27, 1972; Resolution 7647, January 20, 1977; Resolution 9434, June 24, 1982; and Resolution 10164, November 29, 1984.

/14/ The Downtown Plan amended the Transportation Element through Master Plan amendments adopted in City Planning Commission Resolution 10164, November 29, 1984.

/15/ San Francisco Department of City Planning, Urban Design Element, adopted by the City Planning Commission, Resolution 6745, August 26, 1971.

/16/ San Francisco Department of City Planning, Recreation and Open Space Element, adopted by the City Planning Commission, amended, Resolution 11065, July 9, 1987.

/17/ San Francisco Department of City Planning, Neighborhood Center Facilities Plan, adopted by the City Planning Commission, Resolution 7646, January 20, 1987.

/18/ San Francisco Department of City Planning, Plan for Police Facilities, adopted by the City Planning Commission, Resolution 7233, August 24, 1974.

/19/ San Francisco Department of City Planning, Plan for Conservation, adopted by the City Planning Commission, Resolution 7020, May 24, 1973.

/20/ San Francisco Department of City Planning, Plan for Transportation Noise Control, adopted by the City Planning Commission, Resolution 7244, September 19, 1974.

/21/ San Francisco Department of City Planning, Energy Element, adopted by the City Planning Commission, Resolution 9409, June 3, 1982.

/22/ San Francisco Department of City Planning, Community Safety Element, adopted by the City Planning Commission, Resolution 7241, September 12, 1974.

/23/ For an interim period estimated to be about 15 years, the actual limit is 475,000 square feet per year, to compensate for office space that was approved after adoption of the San Francisco Downtown Plan, before the passage of Proposition M. Proposition M also sets aside 75,000 square feet of the limit for the approval of small office projects, between 25,000 and 49,999 square feet in size. This allotment applies to both the permanent (950,000 square feet) and interim (475,000 square feet) annual limits).

/24/ Under CEQA Guidelines, Section 15096, a responsible agency reviews the environmental documentation prepared by the Lead Agency prior to its own conclusion on whether or how to approve the project involved and limits its comments to those project activities that are within its area of expertise or jurisdiction.

/25/ Maritime Strategy II, Maritime and Commercial Land Use Objectives, prepared by Port Commission staff, June 30, 1979, is not discussed because it is out of date, according to Randy Rossi, Director of Planning for the Port.

/26/ San Francisco Port Commission, Conceptual Maritime Master Planning for Southern Waterfront, prepared by Vickerman-Zachary-Miller, Engineering & Architecture Consultants, October 1, 1981.

/27/ The Port divides its property into two general areas at the Ferry Building, the Northern and Southern waterfronts. Odd-numbered piers are north of the Ferry Building; even-numbered piers are south of the Ferry Building.

/28/ Metropolitan Transportation Commission and San Francisco Bay Conservation and Development Commission, San Francisco Bay Area Seaport Plan, 1982, which covers the Ports of San Francisco, Oakland, Encinal Terminal (Alameda), Richmond, Benicia and Redwood City.

/29/ Uses allowed under the Port Priority Use designation include marine terminals and ancillary activities, such as container freight stations, transit sheds and other temporary storage, ship repairing, trucking and railroad yards, freight forwarders, government offices related to the port activity, chandlers, and marine services. Other uses, especially public access and public commercial recreational development (i.e., ferry service, tour/cruise boats, etc.), are permissible uses, if they do not significantly impair the efficient use of the port area.

/30/ San Francisco Department of City Planning, "Container Terminal Options," Special Study for Mission Bay, San Francisco, prepared by Moffat and Nichol Engineers, September 1986.

/31/ BCDC has automatic permit jurisdiction within the 100-foot shoreline band of any Port Priority Use Area (as for any shoreline area). BCDC will, however, exercise whatever powers are available to them to enforce policies that apply to the Priority areas inland of the 100-foot band. Should any federal agencies fund or assist any development within the Port Priority areas, BCDC determination of consistency with the Bay and Specific Area Plans would be required. Bob Batha, Environmental Planner, Bay Conservation and Development Commission, telephone conversation, June 9, 1987.

/32/ Container Cargo: refers to commodities that are placed in steel containers (20 to 45 feet x 8 feet x 8 to 9.5 feet) for transport via ship, rail or truck. Containers have become the prevelant means of cargo handling in the Pacific basin and throughout most of the world. Containers are sturdy, weather-tight boxes that can be easily stacked either within or on top of a ship and quickly transferred to other transportation modes such as trucks or trains.

/33/ San Francisco Department of City Planning, San Francisco Container Terminal Modernization, Final Environmental Impact Report, 85.123E, certified January 23, 1986, pp. 6-19. Randall S. Rossi, Director of Planning, Port of San Francisco, telephone conversation, July 25, 1988.

/34/ Berth: Area of water adjacent to a wharf or pier in which a vessel docks. The typical length of a modern container berth is 1,000 feet.

/35/ Break-bulk: Cargo that is put into, or brought out of a ship's hold in small bulk quantities, usually on a pallet or in a cargo net, such as coffee, bananas, and paper; the traditional method of cargo handling, usually conducted along finger piers.

/36/ McAteer-Petris Act, 1965 California Government Code Section 66605(a).

/37/ Specific restrictions apply to the authorization of bay fill: 1) project benefits must clearly exceed public detriment from the loss of water area; 2) no alternative upland location is available; 3) the amount of fill proposed is the minimum necessary to achieve the purpose; 4) the fill should minimize harmful effects to water, fish, and wildlife resources; 5) the fill must be constructed according to sound safety standards; 6) the fill should establish to the maximum extent feasible a permanent shoreline; 7) the applicant must have valid title to the property in question; and 8) the fill must be consistent with applicable Bay Plan policies.

/38/ Fill includes earth or any other material, including pilings; any water coverage whether on pilings or by cantilever; shoreline protection, e.g. sheet piling; bridges over constant-level canals; and floating structures moored for extended periods of time, such as houseboats and floating docks.

/39/ Bob Batha, Environmental Planner, Bay Conservation and Development Commission, telephone conversation, May 10, 1988.

/40/ Dredging includes any extraction or excavation or excavation by hydraulic or mechanical means of materials underwater, in areas subject to tidal action or in other areas of jurisdiction.

/41/ San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan, adopted January 1969, amended July 1979.

/42/ The supplement does not specify every area along the Bay shoreline where public access may be required by BCDC; absence of a designation would not relieve future BCDC permit applicants of the obligation to provide maximum feasible public access required by BCDC.

/43/ San Francisco Bay Conservation and Development Commission, San Francisco Waterfront Special Area Plan, adopted April 1975, as amended.

/44/ The Special Area Plan is an amendment to the Bay Plan, not a substitute for either it or the McAteer-Petris Act; any proposed development must be consistent with the McAteer-Petris Act, the Bay Plan and the Special Area Plan. Those three documents prescribe rules for maritime and non-maritime development along the San Francisco waterfront. The San Francisco Waterfront Total Design Plan for Piers 7 to 24 north of the Project Area is a supplement to the San Francisco Waterfront Special Area Plan.

/45/ Maritime uses includes maritime terminals and directly related ancillary activities such as container freight stations, transit sheds and other temporary storage, ship repairing, and support transportation uses including trucking and railroad yards, freight forwarders, governmental offices related to port activity, chandlers, and marine services.

/46/ California Government Code Sections 66500 et seq.

/47/ The RTP is submitted biennially in November in even-numbered years to the California Transportation Commission.

/48/ The proposals "do not represent policy commitments by the Commission," but they do "suggest those improvements that should claim the Commission's prior attention when deliberating on the expansion of the system."

/49/ The Transportation Improvement Program (TIP) is mandated in federal regulations and state law (23 CFR 450 and 49 CFR 613; California Government Code Section 65080).

/50/ Most transportation projects are funded in part by federal or state grants and any transportation project in the region that involves such funding is subject to the policies, guidelines and financial programming of the RTP. MTC therefore is responsible for reviewing applications for federal or state grants initiated by a county, city or transportation district within the region for compatibility with the RTP. When MTC approves a transportation project and the project has committed funding, the project is then listed in the TIP.

/51/ Metropolitan Transportation Commission, Transportation Improvement Program, Amendment No. 86-15, adopted March 14, 1986 by MTC Resolution No. 1580.

/52/ Metropolitan Transportation Commission, SCR 74 Peninsula Mass Transit Study: Final Report to the Legislature, July 31, 1985.

/53/ Included in the original 1985 MTC recommendations adopted in Resolution 1547 was the formation of a Joint Powers Agency (JPA), consisting of the JPB members, plus Caltrans. Since Caltrans refused to participate in the JPA, the JPB was established to complete the CalTrain extension studies prior to MTC making any decisions on the provision of long-term rail service to the peninsula corridor. When and if MTC funds are allocated for a CalTrain extension, a JPA will be created for the operation and maintenance of the Peninsula Commute Service.

/54/ California Regional Water Quality Control Board, San Francisco Bay Region, "Water Quality Control Plan San Francisco Bay Basin" (2), adopted July 21, 1982 by the Resources Agency and RWQCB, amended in December 1986.

/55/ Steve Hill, Environmental Specialist, San Francisco Regional Water Quality Control Board, telephone conversation, March 16, 1987.

/56/ Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission with assistance of the California Air Resources Board and the California Department of Transportation, 1982 Bay Area Air Quality Plan, December 1982.

/57/ BAAQMD also reviews projects on the basis of "Air Quality and Urban Development, Guidelines for Assessing Impacts of Project and Plans," published in November 1985 by BAAQMD. This document contains information on legal requirements, methods of analysis, regional meteorology, and BAAQMD rules, plans, administrative procedures, and project mitigation and non-project air quality improvement measures.

/58/ Irwin Mussen, Senior Planner, Bay Area Air Quality Management District, telephone conversation, March 17, 1987.

/59/ Research and development activities, particularly electronics research, usually require a BAAQMD permit; restaurants are usually exempt from the permit process, except for approval of control devices on any smokestacks.

/60/ California State Lands Commission, "The Public Trust - Your Rights to Enjoy California's Waterways," brochure. Also in 1850, the federal government granted "swamp and overflow" lands to California. Most of that land, which included some navigable tidelands and submerged lands as well, was sold to private citizens for agricultural reclamation. Boundary disputes over those lands have resulted from the difficulty in determining the exact boundaries between the tidelands and adjacent overflow lands, particularly in historic tideland areas, which may be diked and partially filled. State lands, such as historic sloughs, are often found within those lands, and thus a public claim may be made to them. True swamp and overflow lands lie above the high-water mark. The SLC has the authority to conduct a title inventory to determine the extent of State fee-owned lands and to sell, lease or otherwise encumber those lands in the public's behalf. All of the lands retained by the state must be administered for the public benefit.

/61/ Jane Sekelsky, Senior Staff Counsel, State Lands Commission, letter, January 6, 1987.

/62/ California Public Utilities Commission, Regulation of Public Utilities and Transportation Companies in the State of California: A Handbook, March 1984.

/63/ William Well, Service and Costs Branch, Transportation Division, California Public Utilities Commission, telephone conversation, April 8, 1986.

/64/ Tack Joe, Railroad Operations and Safety Branch, Transportation Division, California Public Utilities Commission, telephone conversation, April 8, 1986. Terminating or abandoning mainline tracks providing interstate rail service would also require approval by the Interstate Commerce Commission.

/65/ California Department of Transportation, CalTrain Peninsula Commute Service Five-Year Plan 1986-1991, July 1986.

/66/ Master Agreement Operating Contract Between Southern Pacific Transportation Company and the State of California Department of Transportation, Standard Agreement No. 64385, effective July 1, 1980. The Southern Pacific Transportation Company, which operates the CalTrain service, is an entity separate from the Santa Fe Pacific Realty Corporation, the Mission Bay project sponsor. Extension of the Agreement can occur through mutual consent by SP and Caltrans. The agreement authorized Caltrans to purchase and lease passenger cars and locomotives and to acquire, lease, design, construct, and improve track and related facilities.

/67/ No purchase of any right-of-way within Mission Bay serving the station has been negotiated.

/68/ Eric Schatmeier, Senior Transportation Planner, California Department of Transportation, telephone conversation, December 19, 1986.

/69/ Joe Brown, Deputy District Director for Construction, California Department of Transportation, telephone conversation, January 7, 1987; Frank Tedesco, Branch Chief, Project Development, California Department of Transportation, telephone conversation, January 9, 1987.

/70/ California Department of Fish and Game, California Fish and Wildlife Plan, January 1966 (in revision).

/71/ Robert Tasto, California Department of Fish and Game, telephone conversation, April 4, 1986.

/72/ The federal River and Harbor Act of 1899 defined navigable waters as those suitable for commercial transport. Section 404 of the federal Clean Water Act of 1972, and other legislation widened the definition of navigable waters to include rivers, coastal waters, adjacent wetlands, lakes, intermittent streams, and low-lying areas behind dikes along the coast. Its authorities are defined by the following statutes: Sections 9 and 10 of the River and Harbor Act of 1899, which regulates diking, filling or placement of structures or work in or affecting navigable waters of the U.S.; Section 404 of the Clean Water Act of 1972, which regulates disposal of dredged or fill material into the waters of the U.S.; and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, which regulates the transportation of dredged material for purposes of disposing of it in ocean waters. For a proposed project within its jurisdiction, the Corps conducts a "public interest review" by soliciting comments on permit applications through a public notice process. Several agencies have specific review and comment responsibility for Corps-permitted projects; among them are BCDC, RWQCB, California Department of Fish and Game, State Lands Commission, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Coast Guard, and National Marine Fisheries Service.

/73/ In its Bridge Permit Application Guide (1985), the Coast Guard generally defines "navigable waters" as follows: "Navigable waters of the United States for bridge administration purposes are, in general, waters subject to tidal influence, waterways that have a history of substantial commercial navigation, waterways that presently have commercial navigation, and waterways that are susceptible to commercial development. The legal definition of navigable waters is found in 33 CFR 2.05-25(a)."

/74/ U.S. Coast Guard, California Drawbridge Regulations: Governing the Operation of Drawbridges Across Navigable Waters of the United States in California, April 1986.

/75/ U.S. Department of Transportation, U.S. Coast Guard, Bridge Permit Application Guide, April 1985, as specified by the General Bridge Act of 1946.

/76/ Margaret A. Kohl, Fish and Wildlife Biologist, U. S. Fish and Wildlife Service, telephone conversation, April 21, 1986.

/77/ Habitats and habitat conditions of concern in San Francisco Bay generally include water quality, seasonal wetlands, salt marshes, mudflats, shallow-water areas, eelgrass beds, and areas known to support commercial or recreational fishing interests.

/78/ James Bybec, Environmental Coordinator, National Marine Fisheries Service, telephone conversation, November 26, 1986, and letter, December 5, 1986.

/79/ Under circumstances in which habitat/resource damages can be compensated, exceptions to the policy may be allowed. The following conditions are required for such exceptions: 1) incorporation of all feasible measures to eliminate or minimize adverse environmental impacts; 2) adoption of an acceptable combination of habitat restoration, enhancement or off-site acquisition to compensate for adverse environmental impacts that cannot reasonably be eliminated by project modification; and 3) post-project habitat value equal to or greater than pre-project habitat value.

COMPARISON WITH ALTERNATIVES

/80/ San Francisco Department of City Planning, The Mission Bay Plan, Proposal for Citizen Review, January 1987.

/81/ Dr. Randall Rossi, Director of Planning, Port of San Francisco, telephone conversation, January 1986.

/82/ The Project Area, except for the northernmost corner block, a strip of open space on the south side of the channel and a small parcel near Agua Vista Park, is presently zoned M-2 (Heavy Industrial) which allows for all types of uses as either Principal Uses or with Conditional Use approval. All uses under both Alternatives A and B potentially would be allowed under M-2 zoning but it is more likely that industrial and commercial uses would be approved for the area rather than housing and open space. In order to implement the project as a master planned development (either Alternative A or B) rezoning the entire Project Area would be more efficient than applying for Conditional Use permits for each phase of development.

/83/ San Francisco Department of City Planning, "Container Terminal Options," Special Study for Mission Bay San Francisco, prepared by Moffat and Nichol Engineers, September 1986, p. 7.

/84/ San Francisco Department of City Planning, The Mission Bay Plan, Proposal for Citizen Review, January 1987, pp. 3-4.

/85/ Dr. Randall Rossi, Director of Planning, Port of San Francisco, telephone conversation, April 1, 1987.

/86/ Bob Batha, Environmental Planner, Bay Conservation and Development Commission, telephone conversations, April 8 and 10, 1987.

/87/ Bob Batha, Environmental Planner, Bay Conservation and Development Commission, telephone conversation, October 22, 1987.

/88/ Stephen Hill, Environmental Specialist, Regional Water Quality Control Board, telephone conversation, March 16, 1987 and comments on NOP, dated September 30, 1987.

/89/ William Well, Service and Costs Branch, Transportation Division, California Public Utilities Commission, telephone conversation, April 8, 1986.

/90/ Tack Joe, Railroad Operations and Safety Branch, Transportation, Division, California Public Utilities Commission, telephone conversation, April 8, 1986.

/91/ DFG would be interested in and would support the creation of wetlands under Alternative B; however, the agency would not have any jurisdiction or formal role in their creation. Once established, future alteration of the wetlands would fall under the jurisdiction of DFG.

/92/ Wayne R. Till, Chief, Bridge Section North, U.S. Coast Guard, 12th District, letter, October 2, 1987.

/93/ Rose Guerra, Assistant Chief, Bridge Section North, U.S. Coast Guard, 12th District, telephone conversation, November 9, 1987; Wayne R. Till, Chief, Bridge Section North, U.S. Coast Guard, 12th District, letter, December 24, 1987.

/94/ Robert Tasto, Fisheries Biologist, California Department of Fish and Game, Menlo Park, telephone conversation, October 21, 1986.

/95/ BCDC would have authority over the area east of Third Street if federal funding were involved. At this time, however, it is not expected that federal funding would be part of the project.

/96/ State of California, Office of Planning and Research, 1987 California Permit Handbook, December 1986.

/97/ George Gray, Deputy District Director for Planning and Public Transportation, California Department of Transportation, District 4, telephone conversation, November 24, 1987.

/98/ The COE is presently preparing an EIS on the designation of an ocean disposal site for dredged materials.

B. LAND USE, BUSINESS ACTIVITY, AND EMPLOYMENT

SETTING

This section covers two subject areas. First, the discussion of land use, business activity and employment presents information on amounts and types of economic activity as measured by square feet of building space and numbers of workers. Second, the discussion of job and labor force characteristics provides a more detailed description of the types of jobs represented by overall employment estimates and also describes the labor force from which San Francisco employers draw workers. This section covers non-residential land uses, those associated with business activity and employment. Residential land use is described in VI.C. Housing and Population, p. VI.C.15, along with estimates of housing units, households, population, and employed residents.

There are generally four levels to the discussion under each subject area. The characteristics of the Mission Bay Project Area are contained in the first level of discussion. Estimates for the Downtown & Vicinity are presented next. Citywide and regional development, employment and labor force characteristics are in the third level and provide a context for analysis and evaluation of changes in land use and economic activity in the Project Area and the Downtown & Vicinity. The Nearby Areas are discussed in the fourth level and are presented in order to address the more local effects of Mission Bay development beyond the boundaries of the Project Area. For evaluation of land use and business activity, the Nearby Areas of particular interest are those adjacent to the Project Area: South of Market, Showplace Square, North Potrero, the industrial areas of Potrero Hill and Lower Potrero / Central Bayfront, and the piers and seawall lots adjacent to the Project Area.

LAND USE, BUSINESS ACTIVITY AND EMPLOYMENT

Mission Bay Project Area/1/

This section describes land use and business activity as of the end of 1985 in the Mission Bay Project Area (see Figure III.2 Mission Bay Project Area, p. III.7)./2/ Occasionally, the description focuses on the three subareas of the Project Area: north of the Channel, west of Third Street and east of Third Street (see Figure III.2, p. III.7). Appendix B. Land Use, Business Activity, and Employment includes supplemental tables with the Project Area totals split among those subareas. (See Tables XIV.B.1-XIV.B.5, pp. XIV.B.4-XIV.B.8.)

Land Use

Land Area by Use. Table VI.B.1 summarizes the distribution of total land area in the Project Area by use in 1985. The table also accounts for the acreage of the China Basin Channel and developed streets. All areas are approximate. Figure VI.B.1, p. VI.B.4, depicts the overall land use character of the Project Area. The Project Area covers approximately 325 acres of land, about one-third of which (excluding streets and channel) is used by businesses./3/ Close to two-thirds of the Project Area land is in open uses (rail, unattended general use parking lots, vacant). The 71 acres devoted to active and inactive rail use reflect the area's original development for rail transportation purposes. By 1987, most of the trackage in the center of the Project Area had been removed, so that area is no longer in active rail use.

West of Third Street, one-third of the land area is in business use, with the remaining two-thirds consisting of rail yards, unattended parking, or vacant land, confirming the generally open appearance of that part of the Project Area. By comparison, the land east of Third Street is more intensively used. North of the channel, the commuter-rail operation uses much of the land area; about one-fourth of all of the land in that subarea is in active use by businesses.

The vacant land and open areas (86 acres, or about one-third of the land area) are attractive features for many of the businesses in the Project Area. Some of their activities extend into uncrowded nearby streets or the abundant open lots beyond their prescribed property lines. Those areas also satisfy business parking needs. The estimate of land area in use by businesses would be somewhat higher if those unofficial uses were counted.

Building Space and Land Area Used by Businesses. Businesses in the Mission Bay Project Area use both building space and open land area in the course of their operations. Truck terminals using warehouses and large amounts of adjacent land for goods storage and loading are examples of that type of activity. Table VI.B.2, p. VI.B.5, shows building space and separate land area used by businesses in the Mission Bay Project Area. Those building and land use estimates are associated with employment estimates for business activities presented in Table VI.B.3, p. VI.B.6.

TABLE VI.B.1: MISSION BAY LAND AREA, BY USE, 1985 (Acres)/a/

Use	Land Area	Percent of Total Land Area
Land Area in Use by Businesses/b/	91	36
Rail Use and Former Rail Yard/c/	71	28
Unattended General Purpose Parking Lots	6	2
Rest of Land Area / Vacant/d/	86	34
Subtotal	254	100%
Developed Streets	59	
China Basin Channel	12	
TOTAL	325	

/a/ Land area includes land with buildings.

/b/ Corresponds to estimates in Table VI.B.2, p. VI.B.5, of building space and land area used by businesses, with the exception of the commuter-rail facility, which is here classified as land in rail use. The land area estimates in this table (Table VI.B.1) include open land area (land without buildings) used by businesses, plus land area on which buildings sit.

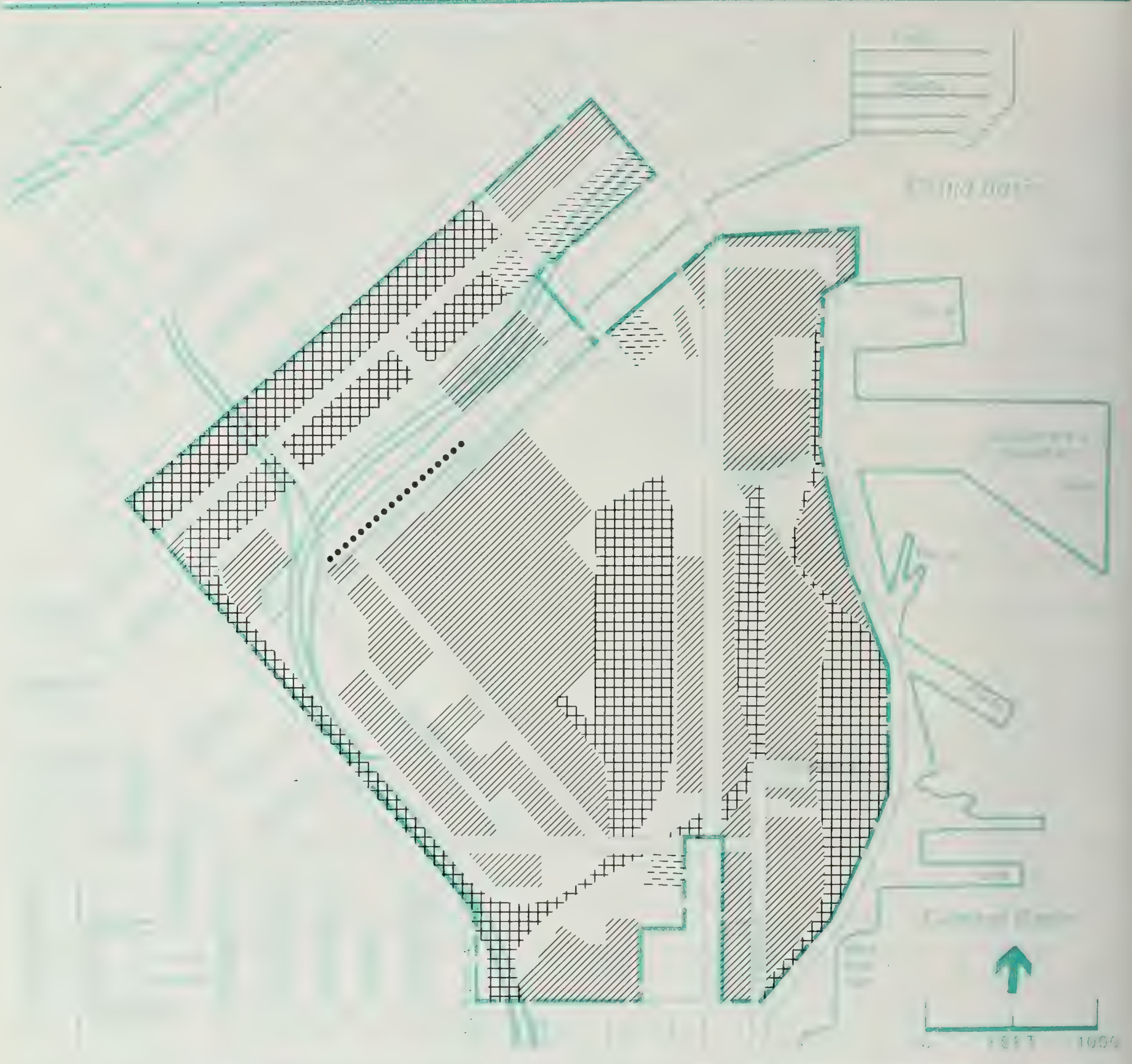
/c/ Includes both freight and commuter rail yards. See note /b/ above. By 1987, much of the trackage devoted to rail freight use west of Third Street was removed, so there is less land area in rail use and more vacant land than indicated on the table.

/d/ Excludes developed streets.

SOURCE: Recht Hausrath & Associates

The Project Area contains a total of about 1.5 million square feet of building space. Most buildings are west of Third Street. North of the channel, a small amount of building space (about 27,000 square feet) is used by the commuter rail station, the San Francisco Recreational Vehicle (SFRV) Park, and the Channel Street Pump Station.

In addition to building space, businesses in the Project Area use about 3.3 million square feet (77 acres) of land for their operations. In some cases, such as storage facilities, open land area is the only space occupied by the business. In many other cases, businesses use undeveloped land area for extensions of interior activity or for parking.



MISSION BAY BOUNDARY

▨ BUSINESS USE

⊞ RAIL USE AND FORMER RAIL YARD

☰ UNATTENDED PARKING LOT

••• HOUSEBOATS

☐ VACANT

FIGURE VI.B.1
GENERAL PROJECT AREA
LAND USE, 1985

SOURCE: Recht Hausrath & Associates

TABLE VI.B.2: MISSION BAY BUILDING SPACE AND LAND AREA USED BY BUSINESSES, BY BUSINESS ACTIVITY, 1985/a/ (Thousands of Gross Square Feet)

Business Activity	Building Space	Percent of Total Building Space	Land Area	Percent of Total Land Area
Transportation & Related Services/b/	822	53	1,551	46
Wholesale/Distribution/Warehouse	435	28	101	3
Vehicle/Equipment Storage	73	5	897	27
Manufacturing/Construction	86	6	289	9
Office	32	2	--	--
Retail/Restaurant	51	3	188	6
Arts/Design	6	1	--	--
Other/c/	30	2	320	9
TOTAL	1,535	100%	3,346	100%

/a/ Land area represents land, exclusive of buildings, used by businesses in the Project Area.

/b/ Includes land and some buildings used by the commuter-rail operation in the Project Area. (Excludes the rail freight yards, which are listed in Table VI.B.1, p. VI.B.3, in the rail-use category.)

/c/ Includes buildings and associated land area for the City fire station facility, San Francisco Recreational Vehicle Park, and Channel Street Pump Station.

SOURCE: Recht Hausrath & Associates

Transportation and Related Services occupies the highest percentage of Project Area building space (53%) and land area (46%). It also is the largest group in terms of number of establishments and number of employees. The Transportation group's total land area is heavily weighted by the approximately 20 acres used by the commuter-rail operations; without that, Transportation activities use considerably less land overall and the Vehicle/Equipment Storage group claims the largest percentage of land area in use by businesses. (While the Vehicle/Equipment Storage category occupies a relatively large share of Project Area land, it represents a small share of total Project Area employment, reflecting the low employment density of that activity.)

About 80% of total Project Area building space consists of truck terminals and warehouse facilities used by Transportation (53%) and Wholesale/Distribution/Warehouse (28%)

TABLE VI.B.3: MISSION BAY ESTABLISHMENTS AND EMPLOYMENT, BY BUSINESS ACTIVITY, 1985/a/

Business Activity	Establishments	Percent of Total Establishments	Employment	Percent of Total Employment
Transportation & Related Services/b/	31	27	906	45
Wholesale/Distribution/ Warehouse	20	18	397	20
Vehicle/Equipment Storage	19	17	101	5
Manufacturing/Construction	7	6	177	9
Office	22	19	106	5
Retail/Restaurant	6	5	293	14
Arts/Design	7	6	8	1
Other/c/	2	2	16	1
TOTAL	114	100%	2,004	100%

/a/ The employment estimates cover all workers based in the area, including those who work elsewhere much of the time, such as truck drivers and sales people.
/b/ Includes the commuter-rail operations.
/c/ Includes the San Francisco Recreational Vehicle Park and Channel Street Pump Station.

SOURCE: Recht Hausrath & Associates

business activities. Office space in the Project Area (all west of Third Street) generally is located in more improved parts of those same terminal/warehouse buildings. The Office and Arts/Design business activities do not officially use any undeveloped land in the Project Area, but they take advantage of adjacent open areas for parking. The Retail/Restaurant category's relatively high ratio of land-to-building-space reflects land devoted to parking at several of the establishments. In the case of the Manufacturing group, the high ratio of land-to-building-space is explained by the two large ready-mix concrete plants, where most activity occurs outdoors.

Business Activity

Establishments and Employment by Business Activity. There are 114 establishments and about 2,000 employees in Mission Bay (see Table VI.B.3)./4/ Total employment in the

Project Area represents less than 1% (0.3%) of citywide employment. Most of the area's establishments and employment are located west of Third Street. The largest single establishment in the Project Area in terms of employment is the Esprit Store east of Third Street.

The text and tables describe information collected in 1985. Since that time, there have been a few changes in the Project Area. Some businesses have moved out; others have moved in; and others have relocated within the Project Area. By 1987 no major changes had occurred, however, that altered the basic description or overall magnitude of employment estimates for the Project Area presented below.

There are several different types of businesses and workers in the Mission Bay Project Area. As noted above, the largest numbers of both establishments and employees are in Transportation and Related Services business activities. That group represents 45% of all employment in the Project Area, including a relatively large proportion of workers, such as truck drivers and delivery persons, who spend most of their day away from the base of their business operations in Mission Bay. The next largest business activity (in terms of employment) is the Wholesale/Distribution/Warehouse group. As with the Transportation group, almost all of that activity is located west of Third Street; there is no Wholesale/Distribution/Warehouse activity north of the channel.

All office activity is west of Third Street. Although there are a relatively large number of office establishments (19% of total establishments), office employment represents 5% of total Project Area employment reflecting the relatively small size of those businesses (less than five employees on average). Similarly, there is a substantially lower percentage of Project Area employees than of Project Area establishments in the Vehicle/Equipment Storage business activity, reflecting the generally small amount of employment associated with storage functions.

There are relatively few establishments in the other categories, although two groups (Manufacturing/Construction and Retail/Restaurant) include large numbers of Project Area workers. There are seven establishments with a total of 177 employees in the Manufacturing/Construction business activity. All are located east of Third Street. The two ready-mix concrete plants are the largest facilities, physically, in the group; three other establishments employ as many or more workers, however. The Retail/Restaurant category is dominated by one establishment: the Esprit Store, with

265 employees, accounts for 90% of the employment in this business activity. (The establishment's total employment includes a large number of part-time jobs.) A cluster of artists, designers, and craft workers have located their businesses in terminal/warehouse buildings west of Third Street. Establishments in the "Other" category are the SFRV Park and the Channel Street Pump Station.

The SFRV Park provides a low-cost visitor facility near downtown San Francisco. The Park has about 200 spaces for campers, trailers and motor homes. The Park provides electrical and sewage hook-ups, bathrooms/showers, laundry facility, and convenience store. Long-distance travellers use the SFRV Park as do local visitors staying in San Francisco for the weekend or for a special event.

Rail Freight Users. Rail freight use is defined to include only establishments with facilities in the Project Area that ship or receive materials/goods by rail. Thirteen Project Area establishments are active users of rail freight lines (see Table VI.B.4). Those 13 businesses (11% of total establishments) represent 442 workers, or 22% of total Project Area jobs, and include four of the area's largest employers. The majority of the activity using rail freight service is located west of Third Street. There are no rail freight users in the Project Area north of the channel. The frequency of rail use varies among establishments. The largest single group of rail freight users consists of trucking/warehousing establishments in the Transportation business activity. (Rail freight facilities and services in the Project Area are described in VI.E. Transportation, beginning on p. VI.E.20; rail freight traffic is described beginning on p. VI.E.25.)

Commuter-Rail Operations. The Southern Pacific Transportation Company, under contract to Caltrans, operates the San Francisco/Peninsula commuter-rail (CalTrain) service from the station at Fourth and Townsend Streets. In addition to the train depot, there are other facilities in the Project Area related to the commuter-rail operations in the area bounded by Fourth, Townsend, Seventh, and King Streets. A total of 155 workers is based here, including managers, clerks, ticket-takers, rail-car cleaners, car-knockers, policemen, train mechanics and electricians, enginemen and trainmen. The employment estimate also includes 18 concession sales workers who are not employees of the railroad but who occupy work space at the station. (VI.E. Transportation, pp. VI.E.36-VI.E.37, includes a description of transit services provided by CalTrain.)

TABLE VI.B.4: MISSION BAY RAIL FREIGHT USERS, BY BUSINESS ACTIVITY, 1985/a/

Business Activity	Establishments	Employment
Transportation & Related Services	6	305
Wholesale/Distribution/Warehouse	3	94
Vehicle/Equipment Storage	2	3
Manufacturing/Construction	2	40
Office	--	--
Retail/Restaurant	--	--
Arts/Design	--	--
Other	--	--
TOTAL	13	442

/a/ Rail freight use is defined to include only establishments with facilities in the Project Area that ship or receive materials/goods by rail.

SOURCE: Recht Hausrath & Associates

Maritime-Related Activities. For purposes of this EIR, "maritime-related" activities are defined as businesses that work with, or as part of, the water transportation industry. Those include: marine repair services, maritime maintenance and equipment supply, cargo handling and storage, intermodal (ship-to-truck or rail) transport, and freight-forwarding and consolidation services. Maritime-related businesses thus include some trucking, warehouse and office establishments that might not generally be considered maritime activities, but are part of the overall maritime transportation system linking production and distribution of goods. In other words, not all maritime-related establishments are directly involved in handling and transporting maritime cargo. Some participate in shipbuilding and repair, maritime equipment manufacturing or supply, or maritime maintenance (e.g., tank transfer, hold cleaning). The maritime relationship does not refer only to the Port of San Francisco. Project Area establishments use Oakland and other Bay Area port facilities as well as San Francisco port facilities.

The 39 Project Area establishments considered maritime-related, and the 679 workers associated with them, represent about one-third of total establishments and employment in the Project Area (see Table VI.B.5). Not all maritime-related activity is located east of Third Street adjacent to the piers. In fact, most maritime-related establishments and

TABLE VI.B.5: MISSION BAY MARITIME-RELATED ESTABLISHMENTS AND EMPLOYMENT, BY BUSINESS ACTIVITY, 1985/a/

Business Activity	Establishments	Employment
Transportation & Related Services	18	497
Wholesale/Distribution/Warehouse	5	32
Vehicle/Equipment Storage	4	3
Manufacturing/Construction	4	108
Office	8	39
Retail/Restaurant	--	--
Arts/Design	--	--
Other	--	--
TOTAL	39	679

/a/ Maritime-related establishments are those in which all or part of the activity involves working with or as part of the maritime industry. That includes ship repair, ship maintenance/servicing, maritime equipment manufacturing and supply, cargo handling and storage, intermodal transport, and freight-forwarding and consolidation services.

SOURCE: Recht Hausrath & Associates

employment are west of Third Street. The 13 maritime-related businesses east of Third Street are about half of the total of 25 businesses located in the area nearest the piers. There are no maritime-related establishments north of the channel.

The largest number of maritime-related establishments and employment are in the Transportation business activity. In fact, more than half of all Transportation establishments reported some form of maritime or port relationship. Project Area businesses expressed their preference for the Mission Bay vicinity as an excellent location for maritime-related activity in terms of the easy access to all major Port of San Francisco facilities and also the relatively easy access to Port of Oakland and other Bay Area maritime facilities.

Some maritime-related businesses are more completely involved in maritime dealings than others. Four Transportation establishments are container freight stations; but three of those also engage in non-maritime transportation activity. Some truckers might use

Port of San Francisco facilities as often as 25 times per day; others report hauling containers only occasionally or randomly. The five Wholesale/Distribution establishments report a wide range of use of the Port of San Francisco, from once a month to six times per day; similar broad ranges are found in the Vehicle/Equipment Storage, Manufacturing and Office categories. Among the eight maritime-related establishments in the Office category, one-half report daily, weekly or monthly Port contact (as cargo consolidators, importers or inspectors). The other half have a tangential relationship limited to one or two annual import/export shipments that are only a small part of their total operations. The Port of San Francisco container terminals (Piers 80 and 94-96) are the San Francisco facilities used most frequently by Project Area maritime-related businesses; Piers 15, 27, 28, 38, 48, 50, and 54 are used by fewer businesses.

Other aspects of maritime activity are discussed elsewhere in this EIR. The Nearby Areas section of this chapter, p. VI.B.36, describes land use on Port property adjacent to the Project Area and presents an overview of activities along the southern waterfront. Truck and rail access available for maritime activities in and adjacent to the Project Area is described in VI.E. Transportation, p. VI.E.20-VI.E.25 and VI.E.49.

Trends in Activity in the Project Area

The Project Area serves a variety of functions in its relatively undeveloped state. The configuration of activities within its approximately 325 acres reflects both historical development patterns and contemporary business needs.

In 1985, the length of time businesses had been located in the Project Area ranged from 70 years to less than one year. Most businesses (65%) had been in the Project Area less than five years; of those, most had moved there within the last two years. The commuter-rail facility has operated longest in the Project Area. Although the use of most of the Project Area for rail freight activity has declined over the years, the commuter rail function has been maintained.

While the Mission Bay Project Area is a relatively undeveloped and underutilized tract of land on the periphery of the Downtown & Vicinity, it still functions as a central distribution location due to the area's relatively good transportation access to central downtown locations, the rest of the City and the region, including the Ports of San Francisco and Oakland. The historical function of the Project Area for distribution and warehousing activities continued to dominate through the early 1980s. The building types and availability of unimproved land also have proved attractive for those businesses needing a staging or storage area. Construction activities (e.g., ready-mix concrete facilities, special trades contractors) find the area's characteristics suitable for a variety of functions including production, office, dispatch, and storage. Parking and other storage for vehicles and equipment are other uses that are attracted by the availability of undeveloped land close to the downtown core. Use of Project Area space by small office and arts/design activities is part of the trend of those uses to locate in older space in the South of Market, North Potrero and Potrero Hill areas and south of Mission Bay along Third Street.

Aside from a few long-term lessees, the Project Area has experienced a high degree of business turnover in recent years. This is attributable in part to a decline in San Francisco of the maritime, industrial and distribution activity that supported earlier tenants in the Mission Bay area. In addition, increased media attention directed at proposals for new development in Mission Bay, and a change in leasing policy initiated in 1983 by the Southern Pacific Development Company (now Santa Fe Pacific Realty Corporation) resulted in turnover of tenants, as well as increased occupancy of building space and land area. Generally, the very low rents were raised substantially, to a level still considered below-market for the greater South of Market area. Leases have been negotiated on a short-term basis with monthly rents in the range of $0.20 - $0.30 per square foot. More aggressive leasing activity on the part of Santa Fe Pacific has brought in new tenants willing to accept a short-term lease in exchange for rental rates that remain below the market rate for similar space in nearby industrial areas. Many businesses are small. They include independent trucking and distribution operations, offices with needs for storage space, start-up operations with minimal location and space requirements, and satellite operations of larger businesses with locations elsewhere in the City.

Sub-leases are common in the Project Area. Some of the relatively large businesses offer sub-leases to smaller firms. Sub-leases defray rental costs and fill space no longer needed by the primary tenants, who maintain control over space that may be needed for future expansion; they also obtain "built-in" customers. Sub-tenants are often smaller businesses that either use their landlord's services (e.g., trucking, warehousing) or provide a service to them (e.g., truck repair, cargo consolidation).

Houseboats and Pleasure Craft/5/

The Project Area includes a small resident houseboat community and a pleasure-boat marina. Both houseboat and pleasure craft berths are located in the China Basin Channel at Wharf 60 on the north side of Channel Street. The boating community (both resident and non-resident) is represented by the Mission Creek Harbor Association. The Harbor Association is a tenant of the Port of San Francisco, using a 1,200-foot-long section of the channel where boats are berthed as well as an adjacent strip of land to the south and a paved portion of Channel Street. A permit issued by the Bay Conservation and Development Commission (BCDC) specifies the number and types of craft that may occupy the portion of the channel west of the Fourth Street Bridge: 20 houseboats ("live-aboards") and 35 mobile craft. Nineteen of the 20 houseboat berths are occupied; there are 34 houseboat residents. The characteristics of this population are described in VI.C. Housing and Population, p. VI.C.15. The 35 berths for pleasure craft generally are fully occupied. Boat usage varies, with most activity occurring on weekends. Most owners of boats berthed in the channel live in San Francisco.

Downtown & Vicinity/6/

The area of most concentrated building development and economic activity in San Francisco is the area referred to in this EIR as Downtown & Vicinity. About 60% of total San Francisco employment is in the Downtown & Vicinity.

Figure IV.1, p. IV.5, shows the boundaries of the Downtown & Vicinity and its subareas: the C-3 District, South of Market, Northeast Waterfront, Civic Center/South Van Ness, and Mission Bay. The following discussion of building space, business activity and employment in the Downtown & Vicinity in 1985 focuses on the subareas outside of Mission Bay, the Project Area described in detail in the preceding subsection. The tables that follow indicate whether or not Mission Bay is included. Any estimates for the total Downtown & Vicinity include estimates for the Mission Bay Project Area.

Space by Use

The dominant business activities in the Downtown & Vicinity are office, retail and hotel uses. Those uses define the character of much of the area. They are concentrated in the central parts of the C-3 District, and they also have become the predominant uses in industrial and warehouse buildings in the Northeast Waterfront and parts of South of Market.

Other business activities in the area include: sales/showroom uses; cultural/institutional/educational uses; manufacturing, warehouse and distribution activities; service businesses; and parking uses. The sales/showroom activity is centered in the Showplace Square area south of Market Street; there also are a few large showroom or trade mart facilities along Market Street in the C-3 District. The cultural, institutional and educational uses are clustered in the Civic Center area, although those types of activities also are found scattered throughout the Downtown & Vicinity in institutional buildings and other older space. Remaining manufacturing, distribution, warehouse, and service businesses are located primarily South of Market. Some of these types of businesses (generally small operations) continue in parts of the C-3 District, the Northeast Waterfront, and the Civic Center/South Van Ness areas.

Table VI.B.6 shows how building space was used in the Downtown & Vicinity in 1985. The table and the discussion in this section cover commercial uses, i.e., space associated with business activity. Residential use is covered in VI.C. Housing and Population, p. VI.C.11. Estimates for Mission Bay are not included in this table, as they were described in the discussion of the Project Area, p. VI.B.1, above.

In 1985, businesses occupied about 124 million gross square feet of space in the Downtown & Vicinity excluding the Mission Bay Project Area. Office, retail and hotel use accounted for almost three-quarters of total occupied space. Occupied office space, at 68.9 million gross square feet, was 55% of total occupied space in the Downtown & Vicinity. Retail and hotel uses each occupied about 10 million gross square feet. All other uses besides office, retail and hotel activities occupied about 34 million gross square feet of space.

Total space in the Downtown & Vicinity in 1985 was estimated to be about 141 million gross square feet, of which about 17 million gross square feet were vacant. Most vacant space is office space, much of it in recently completed office buildings and buildings partially or completely vacated by move-outs or corporate consolidations. Some vacant space is older space (office, industrial or warehouse) awaiting conversion or demolition.

TABLE VI.B.6: SPACE IN THE DOWNTOWN & VICINITY EXCLUDING MISSION BAY, BY USE, 1985 (Thousands of Gross Square Feet)

Space By Use	Space	Percent of Total Occupied Space
Occupied Space		
Office/a/	68,931	55.6
Retail	10,208	8.2
Hotel	10,732	8.7
Other Space/b/	34,004	27.5
Subtotal	123,875	100.0%
Vacant Space/c/	17,253	
TOTAL SPACE/d/	141,128	

NOTE: Building space is categorized according to the types of businesses occupying the space.

/a/ "Office space" includes space occupied by office uses. Retail space in office buildings (e.g., ground floor retail space) is categorized as retail space. Space occupied by government office activities is included in the office category. Older industrial or warehouse space converted to office use is categorized as office space.
/b/ "Other space" includes manufacturing, warehouse, services, distribution, showroom, institutional, and parking uses.
/c/ Most "vacant space" in 1985 was office space. Vacant space includes more than space that is vacant and available for lease. For 1985, the estimate includes office space vacated due to move-outs or business consolidations that was not currently on the market and may be temporarily occupied at lower-than-average employment densities, but which could accommodate employment growth. "Vacant space" also includes other unoccupied warehouse or industrial space that could be converted to another use or demolished for a new construction site.
/d/ "Total space" includes building space identified in land use inventories for each subarea of the Downtown & Vicinity and accounts for new construction, demolition and conversion (since the dates of those inventories) associated with projects completed and available for occupancy at the end of 1985.

SOURCE: Recht Hausrath & Associates

(A subsequent section under the heading "Downtown Office Context," p. VI.B.25, describes recent changes in the downtown office space market in more detail.)

Employment by Business Activity and by Subarea/7/

In 1985, there were about 340,000 people employed in the Downtown & Vicinity (see Table VI.B.7). Most of these, about 250,000 or 75%, were office workers./8/ Retailing, with about 29,000 workers, accounted for the next largest percentage of employment. None of the other individual business activities accounted for more than 5% of total employment in the Downtown & Vicinity. Services, distribution and manufacturing activities together represented about 19,000 workers, just over 5% of the total. Both hotel activity (concentrated in the Union Square area) and cultural/institutional/educational activity (concentrated in the Civic Center area) represented sizable numbers of workers in the Downtown & Vicinity. Sales/showroom, building maintenance and construction employment complete the range of business activities in the Downtown & Vicinity.

TABLE VI.B.7: EMPLOYMENT IN THE DOWNTOWN & VICINITY EXCLUDING MISSION BAY, BY BUSINESS ACTIVITY, 1985

Business Activity	Employment	Percent of Total Employment
Office	249,740	73.5
Retail	28,910	8.5
Hotel	12,240	3.6
Sales/Showroom	4,550	1.4
Cultural/Institutional/Educational	10,970	3.2
Services	7,500	2.2
Distribution	4,590	1.4
Manufacturing	6,890	2.0
Building Maintenance/Security	6,450	1.9
Construction	7,890	2.3
TOTAL	339,730	100.0%

SOURCE: Recht Hausrath & Associates

Table VI.B.8 shows estimates of employment in the Downtown & Vicinity by subarea, including the Mission Bay Project Area, for 1985. The C-3 District clearly dominates as the location for the majority of employment in the Downtown & Vicinity. It not only is the largest subarea, in terms of land area, but also the most densely developed. The

TABLE VI.B.8: EMPLOYMENT IN THE DOWNTOWN & VICINITY, BY SUBAREA, 1985

Subarea	Employment	Percent of Total Employment
C-3 District	261,980	76.7
South of Market	28,280	8.3
Northeast Waterfront	27,450	8.0
Civic Center / South Van Ness	22,020	6.4
Subtotal	339,730	99.4
Mission Bay	2,000	0.6
TOTAL	341,730	100.0%

SOURCE: Recht Hausrath & Associates

C-3 District has almost 10 times as much employment as any of the other subareas. In 1985, the Project Area represented less than 1% of total employment in the Downtown & Vicinity.

Citywide and Regional Context

Comparison of Employment in the Downtown & Vicinity to Citywide Employment

Most of San Francisco's employment is concentrated in the Downtown & Vicinity. Table VI.B.9 presents a comparison of that employment to total City employment for 1985 by Standard Industrial Classification (SIC) category. (Employment data are published only in terms of SIC; therefore, the estimates for the Downtown & Vicinity previously presented by business activity are converted here to SIC categories for purposes of comparison to citywide data.)

In total, about 60% of San Francisco's employment is in the Downtown & Vicinity. The share varies by category. Classifications representing office employment in San Francisco have the highest percentages in the Downtown & Vicinity: manufacturing and mining; transportation, communications and utilities (TCU); finance, insurance and real estate (FIRE); and business and professional services. In fact, comparing the

---

TABLE VI.B.9: COMPARISON OF EMPLOYMENT IN THE DOWNTOWN & VICINITY TO CITYWIDE EMPLOYMENT, 1985

Standard Industrial Classification (SIC)	Employment: San Francisco/a/	Employment: Downtown & Vicinity/b/	Employment in the Downtown & Vicinity as a Percent of Total City Employment
Manufacturing & Mining	44,600	25,530	57
Transportation, Communications & Utilities (TCU)	47,600	38,300	80
Wholesale Trade	37,100	20,850	56
Retail Trade	78,400	29,810	38
Finance, Insurance & Real Estate (FIRE)	84,800	76,900	90
Services	183,400	101,290	55
Hotels	15,300	12,240	80
Business & Professional Services/c/	88,600	60,610	68
Other Services/d/	79,500	28,440	36
Government	90,300	41,100	45
Construction/e/	17,700	7,950	45
Agriculture	1,000	--	--
TOTAL	584,900	341,730	58%

NOTE: Employment data are published only in terms of Standard Industrial Classification (SIC); therefore, the estimates for the Downtown & Vicinity previously presented by business activity are converted here to SIC categories for purposes of comparison to citywide data.

/a/ California Employment Development Department (EDD) data for December 1985 (in Annual Planning Information: San Francisco City and County, May 1986) adjusted by Recht Hausrath & Associates (RHA) to reflect annual average employment (based on comparison of December series and annual average series through 1981) and to incorporate an estimate of the self-employed in each SIC category (based on analysis of U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System employment data for San Francisco, including the self-employed).

/b/ Estimates for the Downtown & Vicinity including Mission Bay.

/c/ Includes business, legal, miscellaneous, and other professional services (SIC's 73, 81, 89, and 074, 075, and 078).

/d/ Includes personal services, auto and miscellaneous repair, motion pictures, amusement and recreation, health services, private education, social services, museums and membership organizations (SIC's 72, 75, 76, 78, 79, 80, 82, 83, 84, and 86).

/e/ Estimate for the Downtown & Vicinity includes only employment directly related to building activity in the area.

SOURCE: Recht Hausrath & Associates

estimate of total office employment in the Downtown & Vicinity (from Table VI.B.3, p. VI.B.6, for Mission Bay and Table VI.B.7, p. VI.B.16, for Downtown & Vicinity excluding Mission Bay) with the estimate of total City employment in 1985 demonstrates that office employment in the Downtown & Vicinity (occurring in several SIC categories) accounts for 43% of citywide employment. A large share of citywide hotel employment also is located in the Downtown & Vicinity. The relatively high percentage of citywide wholesale trade employment located in the Downtown & Vicinity is attributable to sales/showroom activity (primarily in the Showplace Square area) and office activity (e.g. sales representatives and import/export businesses).

In the rest of the City, retail trade, neighborhood services, education, and medical and health care institutions are the major employers. This is reflected in the SIC information. Retail trade, other services and government are the sectors in which the majority of total San Francisco employment is located outside the Downtown & Vicinity.

Employment in San Francisco

Table VI.B.10 illustrates the overall composition of employment in San Francisco. In general, the economy appears diversified; no one category dominates. The categories accounting for the largest percentages of citywide employment are services, government, FIRE, and retail trade, which together represent 75% of total City employment.

Among the major SIC categories, services accounts for the most employment in the City--almost one-third of all City jobs. This category is diverse, including, for example, office activities, hotels, repair businesses, and private medical facilities. The table shows services classified in three major groups.

The highest percentages of citywide employment are in government, business and professional services, and FIRE; each accounts for about 15% of total City employment. Government activity in the City is varied, including administrative offices of City, state, and federal agencies located in the Downtown & Vicinity, as well as educational and health care institutions and municipal and federal facilities outside the Downtown & Vicinity. The predominance of business and professional services and FIRE employment reflects San Francisco's role as a financial and business service center.

TABLE VI.B.10: SAN FRANCISCO EMPLOYMENT BY STANDARD INDUSTRIAL CLASSIFICATION, 1985

Standard Industrial Classification (SIC)	Employment/a/	Percent of Total Employment
Manufacturing & Mining	44,600	7.6
Transportation, Communications & Utilities (TCU)	47,600	8.1
Wholesale Trade	37,100	6.3
Retail Trade	78,400	13.4
Finance, Insurance & Real Estate (FIRE)	84,800	14.5
Services	183,400	31.4
Hotels	15,300	2.6
Business & Professional Services/b/	88,600	15.2
Other Services/c/	79,500	13.6
Government	90,300	15.5
Construction	17,700	3.0
Agriculture	1,000	0.2
TOTAL	584,900	100.0%

/a/ California Employment Development Department (EDD) data for December 1985 (in Annual Planning Information: San Francisco City and County, May 1986) adjusted by Recht Hausrath & Associates (RHA) to reflect annual average employment (based on comparison of December series and annual average series through 1981) and to incorporate an estimate of the self-employed in each SIC category (based on analysis of U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System employment data for San Francisco, including the self-employed).

/b/ Includes business, legal, miscellaneous, and other professional services (SIC's 73, 81, 89, and 074, 075, and 078).

/c/ Includes personal services, auto and miscellaneous repair, motion pictures, amusement and recreation, health services, private education, social services, museums and membership organizations (SIC's 72, 75, 76, 78, 79, 80, 82, 83, 84, and 86).

SOURCE: Recht Hausrath & Associates

Retail trade and "other services" also rank relatively high in percentages of total City employment. Activity in both categories is dispersed throughout the City, with concentrations in Union Square, Nob Hill, the Financial District and in other tourist-oriented areas. While tourism is a critical component of the City's economic vitality, hotel employment alone represents less than 5% of total City employment;

employment related to tourism (e.g., stores and shops, restaurants and bars, travel agents, performing arts) is found in other categories as well. Manufacturing and mining, TCU and wholesale trade (historically, the industrial sectors of the economy) are not dominant in San Francisco's employment picture. Moreover, the types of manufacturing, transportation-related or wholesale employment in San Francisco in the mid-1980s are primarily office functions or activities that serve the primary economic sectors described above.

San Francisco Within the Bay Area Region

There were about 2.8 million jobs in the nine-county Bay Area region in 1985, according to the California Employment Development Department (see Table VI.B.11). Twenty

TABLE VI.B.11: BAY AREA EMPLOYMENT BY COUNTY, 1985

County	Employment	Percent of Total Employment
Alameda	550,200	20
Contra Costa	247,400	9
Marin	89,400	3
Napa	37,400	1
San Francisco	565,800 /a/	21
San Mateo	282,800	10
Santa Clara	796,600	29
Solano	81,400	3
Sonoma	120,200	4
TOTAL	2,771,200	100%

NOTE: The employment data in the table are for December because 1985 annual average employment data are not available at the county level. The data do not include the self-employed. (See also Table XIV.B.6, p.XIV.B.10).

/a/ For consistency with the rest of the data series presented in this table, the total employment shown for San Francisco is for December 1985 from the May 1986 California Employment Development Department Annual Planning Information document for San Francisco. For other analyses in this EIR, the December estimate has been adjusted to reflect annual average employment and to incorporate an estimate of the self-employed (see Table VI.B.9, p. VI.B.18, and Table VI.B.10, p. VI.B.20, particularly note /a/ in each table). There would be no difference in the points illustrated in the table above and described in the associated text if an annual average series, including the self-employed, were available for all counties.

SOURCE: California Employment Development Department, Annual Planning Information: 1986-1987, May 1986 (for each county).

percent were in San Francisco. Santa Clara County claimed the highest percentage of the region's employment, almost 30% of the total. Alameda County had about the same share (20%) as San Francisco. These three counties (Alameda, San Francisco and Santa Clara) accounted for 70% of the region's employment. Contra Costa and San Mateo Counties each had about 10% of that total employment. The rest of the region's employment was distributed in relatively small amounts among more outlying counties.

Regional employment data reflect the Bay Area's economic development pattern. By 1985, there were two major centers of economic activity in the Bay Area. The historic center still remains in the central part of the region, with downtown San Francisco and the older cities of western Alameda County forming a hub for headquarters, finance and business services activities as well as population-serving activities. The newer center in the South Bay revolves around high-technology research, development, assembly, administrative functions and related services associated with "Silicon Valley." That center encompasses Santa Clara County and parts of San Mateo and Alameda Counties. In between and on the periphery of the region, suburban employment centers have developed in recent years, reflecting expansion and relocation of center-city office functions as well as requirements of a growing suburban residential population. In particular, recent booms in office development in San Mateo County, Contra Costa County, suburban Alameda County, and Marin County have resulted from this decentralizing trend. Economic activity is less dense in more outlying areas than in either the major centers or closer-in suburban areas.

Economic Trends

San Francisco and the Rest of the Region

Over the 13-year period 1972-1985, Bay Area employment grew by nearly one million jobs at an annual rate of more than 3% per year./9/ During the same period, San Francisco employment increased by about 100,000 jobs at an annual rate of about 1.6% per year. San Francisco's share of total regional employment declined over this period since the rest of the region grew at a faster pace. The shift reflects emergence of a major center of economic activity in the South Bay as well as redistribution of employment throughout the metropolitan area with the advent of suburban employment centers. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.3-XIV.B.9, presents the background tables for this discussion and more detailed analysis of the data. Table XIV.B.6, p. XIV.B.10, presents Bay Area employment data for 1972, 1981 and 1985.

There are two distinct segments in the 1972-1985 period: 1972-1981 and 1981-1985. Employment grew at a fast pace in both San Francisco and the region through 1981. Employment in the City grew at 2.4% per year while the region grew at 3.6% per year. Over this nine-year period, employment in the City increased by about 12,000 jobs per year, on average. San Francisco and the rest of the region were following similar patterns of strong growth. After 1981, however, the patterns diverge. San Francisco employment declined in 1982 and 1983, but began to grow slowly in 1984 and 1985. By 1985, employment in the City was still below the 1981 level. Overall, San Francisco had a net loss of employment between 1981 and 1985. In the rest of the region, between 1981 and 1985, the rate of growth was slower than in the preceding period but there was no absolute employment decline. While there was employment decline from 1981 to 1982, reflecting the consequences of the national economic recession, employment in other parts of the region was higher by 1985 than in 1981.

Alameda and Contra Costa Counties are exceptions to the overall pattern for the rest of the region during these time periods. The rate of employment growth from 1981-1985 in those counties was higher than in the preceding period. When viewed in conjunction with San Francisco data, showing employment decline, their pattern reflects relocation of business operations from San Francisco to East Bay suburbs, concentrated in the early 1980s.

San Francisco's Downtown & Vicinity

Changes in Economic Activity in the Downtown & Vicinity. Employment trends for San Francisco to a large extent reflect the story of the Downtown & Vicinity during this time period. During the 1970s through 1981, employment in the Downtown & Vicinity grew rapidly, faster than the rest of the City so that the percentage of total City employment located in the Downtown & Vicinity increased. Employment growth was based on San Francisco's role as a headquarters and financial center for the West Coast and on the general expansion of the service sector of the economy during that period. The resultant growth of administrative, governmental, financial, legal, and other professional and business service activities stimulated a boom in office construction that continued through the early 1980s. A strong retail sector as well as convention and tourism activity also supported growth in the Downtown & Vicinity; cultural and performing arts activity shared in the expansion of the 1970s. Employment growth in all of those sectors was offset somewhat by employment decline in older industrial, distribution and service establishments remaining in the Downtown & Vicinity.

Similarly, changes in economic activity in the Downtown & Vicinity are primarily responsible for the decline in San Francisco employment from 1981 through 1985. Total employment in the Downtown & Vicinity declined by about 4,000 from a high of about 346,000 jobs in 1981 to 342,000 jobs in 1985 (see Table XIV.B.7, p. XIV.B.11). The pattern of decline is particularly dramatic because it follows the period of strong employment growth in the 1970s.

During this same period, total employment in the City also declined from its 1981 high by about 4,400 jobs (see Table XIV.B.7, p. XIV.B.11). Analysis of recent activity in the Downtown & Vicinity excluding Mission Bay indicates a somewhat larger employment decline in the Downtown & Vicinity than in the City overall. In the rest of the City, it is likely that long-term declines in manufacturing and distribution sectors located in the southern parts of the City were offset by growth in retail and service activity in the neighborhoods. The result was relatively stable employment overall for those areas, while employment in the Downtown & Vicinity declined.

The pattern of recent change (1981-1985) in employment in the Downtown & Vicinity varies by business activity. The office sector fared the worst: with a net decline of more than 6,000 workers from 1981 through 1985. Within the office category, even larger declines for some San Francisco businesses due to relocations, mergers, the recession in the early 1980s, and other business problems were offset by continued strong growth for other San Francisco office activities (primarily business and professional services and certain sectors of the financial services industry). The net decline in office employment was offset somewhat by growth in other sectors, primarily retail and hotel activity. Thus, the overall decline in employment was not as severe as the drop for the office sector.

The change in employment between 1981 and 1985 was not distributed evenly among subareas of the Downtown & Vicinity (see Table XIV.B.8, p. XIV.B.12). The C-3 District, where most large corporate office facilities are located, shows a net loss of 5,600 workers. The South of Market also shows a decline, attributable to relocation of office activity and decline of employment in manufacturing, distribution and service businesses in part as a result of development pressures for conversion of industrial space to office use. On the other hand, there were net increases in employment in the Northeast Waterfront and Civic Center/South Van Ness subareas, reflecting the shift of some office activities to those relatively low-cost locations, as well as associated increases in retail activity in those areas.

Downtown Office Context - The Early 1980s. The San Francisco office market changed dramatically between 1981 and 1985. Office vacancy rates ranging from 0.1% to no more than 0.4% from September 1979 through December 1981 were accompanied by a peak period for office rents, with space in new buildings ranging from about $30 per square foot to $50 per square foot for premium space./10/ Both office building development and office employment growth had been proceeding at a rapid pace through 1981. Office development continued at a fast rate through 1985; employment growth did not keep pace.

The widening gap between office space supply and demand in the early 1980s was attributable to a combination of factors that, while affecting the real estate industry nationwide, had a particularly dramatic effect in San Francisco following the boom years of the 1970s. The tight market situation in the late 1970s/early 1980s encouraged development proposals because the rate of return from investment in new space appeared very attractive. The prospect of stricter controls on new development in San Francisco (the Downtown Plan) generated a rush to obtain project approval under less restrictive controls. Foreign and institutional investments became an important factor in office development during this time period, and capital from such sources was another stimulus to office projects.

While those factors combined to stimulate the supply side, other factors were working in the opposite direction on the demand side. The overall economic slowdown resulting in fewer business start-ups and expansions reduced demand for space. Decisions to relocate large amounts of employment (primarily in "back-office" functions) to lower-cost suburban locations were implemented. Corporate mergers and acquisitions resulted in relocation of headquarters activities to other cities and consolidation of functions and staffing within the City. The poor economic performance of some companies (in the oil and gas and financial industries, in particular) dampened an important traditional source of demand for space in San Francisco.

The absolute decline in office employment described in preceding sections indicates that less office space was occupied in 1985 than in 1981. The office vacancy rates reflect some of this dramatic change, ranging from 11% in mid-1985 to 18% by December 1986 (up from less than 0.5% in 1981)./11/ Office rents subsequently dropped; quoted annual rental rates for space in prime locations ranged from approximately $24 per square foot to $40 per square foot in the mid-1980s, about 80% of the 1981 level. Effective rental rates may be substantially lower as a result of concessions such as periods of free rent and generous improvement and moving allowances. The large amount of sublease space on the market contributes to lower rent levels./12/

Information on recent office building construction, when viewed in the context of changes in office employment presented above, demonstrates the degree to which "over-building" has characterized San Francisco's office market in the past few years. From 1960 through 1981, almost 30 million square feet of office space was added in major office buildings in San Francisco. Almost all of the development occurred in the Downtown & Vicinity. Over the 22-year period, this development represents an average addition of 1.3 million square feet of space per year./13/ Considering the vacancy rate of less than 1% in 1981, virtually all of that new space was absorbed. Between 1981 and 1985, about nine million square feet of office space was added to the supply, at a rate of more than two million square feet per year./14/ Although some of the new space was leased and occupied, leasing activity did not represent much of a net addition to occupied space downtown during the 1981 to 1985 period. Much of the leasing came from businesses moving from one building to another, some to take advantage of a buyers' market in office space. The overall decline in office employment, freeing space in existing buildings to accommodate future expansion, exacerbated the over-supply situation attributable to new construction.

Downtown Office Context-Beyond 1985. The combination of events of recent years is not typical of a longer-term outlook. Economic vitality is expected to return to the office sector, although employment growth rates in the future will be slower than those in the 1970s. Most major company relocations from San Francisco to suburban office developments already have occurred; they were largely one-time phenomena. Increasing congestion and development costs in the suburbs make San Francisco again competitive with such alternative locations. Given changes in the office market situation, some firms are reconsidering their relocation decisions. In addition, San Francisco remains the location of choice for many office functions, in spite of well-publicized move-outs. Many small office operations and many corporate headquarters remain in the City; legal, financial, marketing, consulting, and other business services continue to place a premium on the convenience, image and traditions of doing business in San Francisco. On the supply side, the boom in office building development is not expected to continue indefinitely. Both the Downtown Plan and Proposition M (see discussion below) impose formal constraints on the location and amount of new development allowed. Because of those factors, in spite of a current "soft" market, San Francisco ranks as a top market for real estate investors. Their decisions are based on perceived relative security of such investments and a favorable long-term outlook on rates of return compared to other potential investments.

Proposition M. In November 1986, San Francisco voters approved Proposition M which (among other things) limits the amount of office approvals allowed on an annual basis. (See VI.A. Public Plans, Policies and Permits, pp. VI.A.13-VI.A.14, for a general description of Proposition M as it has been incorporated in the City Planning Code. Chapter V. The EIR Alternatives and the Approval Process, p. V.41, describes Proposition M as it pertains to development of the Project Area.) Under Proposition M, the previous three-year term of a program limiting office development approvals to 950,000 square feet per year was repealed and the annual limit was continued indefinitely./15/ Under Proposition M, the 950,000-square-foot annual limit also must be adjusted to account for additional office space approved since November 29, 1984. Effectively, new office space approvals are limited to 475,000 square feet annually until the inventory of office space approved since November 29, 1984 is reduced to zero at a rate of 475,000 square feet per year./16/

In January 1987, the Department of City Planning presented the Planning Commission with an inventory of office projects already approved that would count against the annual limit. The Department concluded that a total of about 7.2 million square feet of office space was included in the inventory. Since this amount of space (7.2 million square feet) is required to apply towards the annual limit in increments of 475,000 square feet per year, it would take almost 15 years for the additional office space allowed to be approved at a rate of 475,000 square feet each year./16,17/ Since the approval period dates from October 17, 1985 (the effective date of the Downtown Plan Ordinance), the 475,000-square-foot annual limit may be presumed to be in effect through the year 2000.

If the total square footage allowed to be approved is not fully allocated in any one year, the unallocated amount can be carried forward and added to the next year's limit. Thus, since no projects were approved under the first Office Development Limitation Program approval period (October 1985-October 1986), a total of 950,000 square feet could be approved during the period ending in October 1987./16/ In July 1987, the Department of City Planning recommended and the Planning Commission approved three office projects representing a total of about 625,000 square feet of additional office space.

Outlook for Other Sectors. Retail and hotel activity have not suffered the same declines as office activity in recent years. Employment in those sectors has increased. Although both are sensitive to such external factors as consumer confidence and the value of the dollar, retail and hotel activity are important components of the long-term economic vitality of San Francisco. Tourism, conventions, business travel, and an expanded regional retailing center with the new stores and attractions such as Yerba Buena Gardens support the continued strength and stability of retail and hotel sectors. Cultural facilities and performing arts share in this component of economic activity.

The decline of older industrial and distribution activities is not unique to San Francisco but is a long-term attribute of cities nationwide. In San Francisco, most of such facilities in the Downtown & Vicinity have become sites for new development or have been converted to other uses. Former occupants have have relocated or gone out of business. While some relocated outside the City, others found suitable facilities elsewhere within the Downtown & Vicinity or the rest of the City but further from the center. Thus, there remains a core of older industrial, distribution and service businesses in the Downtown & Vicinity. In addition, new types of small-scale manufacturing, printing, design and production, wholesaling, and crafts establishments are filling in some outmoded older industrial facilities. The following description of Nearby Areas focuses on the emergence of these types of activities in and near the Downtown & Vicinity.

Nearby Areas

The purpose of the Nearby Areas analysis is to examine the localized effects of Mission Bay development. Mission Bay's location means there are a variety of nearby area conditions. The South of Market area adjacent to Mission Bay to the north has experienced a high level of development activity in recent years and is commonly considered an extension of "downtown." On the other hand, the older industrial areas adjacent to Mission Bay on the west and south, while undergoing some changes in the types of activities doing business there, have been less directly influenced by expansion of downtown. Through the early 1980s, the story of development of these areas continues to be that of an evolving industrial/warehousing district. Finally, Mission Bay's location on the waterfront introduces consideration of maritime activity, specifically the functions on piers and associated seawall lots owned by the Port of San Francisco adjacent to the Project Area.

For this discussion of businesses and employment, the EIR focuses on the following Nearby Areas ringing Mission Bay:

- South of Market;
- Showplace Square;
- North Potrero and the industrially zoned portions of Potrero Hill;
- Lower Potrero / Central Bayfront; and, separately,
- the piers and associated seawall lots east of the Project Area.

In addition, the Inner Mission and South Bayshore areas are discussed. Although they are further removed from the Mission Bay Project Area, they complete the picture of the industrial areas in the southeastern part of the City. Figure IV.2, p. IV.6, shows the boundaries of the Nearby Areas.

Employment Overview/18/

Employment in industrial and related activities in the Nearby Areas adjacent to the Mission Bay Project Area is a relatively small part of total City employment. Excluding South of Market and Showplace Square, the Nearby Areas to the west and south of Mission Bay account for about 1.5% of total City employment in 1985. Of the approximately 28,000 workers in the larger South of Market area including Showplace Square (part of the Downtown & Vicinity, see Table VI.B.8, p. VI.B.17), about one-half are in services, sales/distribution, and manufacturing business activities. Even this sub-group of South of Market employment is large relative to the numbers for the other Nearby Areas. There are about 2,700 workers in the industrial areas of the North Potrero and Potrero Hill. Estimates of employment for the Lower Potrero / Central Bayfront area range from 5,400 to 6,800 jobs. There are about 600 people working on piers adjacent to the Project Area, with one facility accounting for about 70% of that total.

South of Market / Showplace Square/19/

South of Market. The predominant zoning in the South of Market is industrial. The M-1 and M-2 designations are the Planning Code's most permissive zoning categories. There are pockets of residential zoning in the western part of the South of Market along Folsom and Harrison Streets. (South of Market includes most of the area covered by the proposed South of Market Plan, as well as Rincon Hill, South Beach, parts of Yerba Buena Center, and blocks adjacent to the Project Area at Third Street, south of Townsend Street.)

Fourth Street separates two parts of South of Market that have distinctive characteristics. East of Fourth Street, many older manufacturing and distribution activities have been replaced by a variety of new uses. Old printing facilities, shipping warehouses and smaller maritime and metal products factories have given way to office, housing, retail, film and video production, artists' and designers' studios, and other uses. Along Second Street and Townsend Street, new construction and extensive conversion for offices has been completed or is underway. The South Beach Redevelopment Area is currently under construction with a marina, retail development, and several waterfront residential complexes. Smaller buildings in the Rincon Hill area have been converted to office use, and mixed-use projects conforming to a recently adopted Rincon Hill Plan are proposed or underway. New office and housing development has occurred as part of the redevelopment plan for the Yerba Buena Center area.

Office development pressure in this part of South of Market has its roots in the office market conditions of the 1970s-early 1980s. The South of Market area offered larger parcels of land than the C-3 District for lower-rise back-office development. It also offered older structures suitable for rehabilitation and conversion to office space for small businesses or divisions of large companies.

Although development activity may indicate substantial transformation, employment in the eastern South of Market lags behind physical changes that have taken place there. Much potential office space (particularly new construction and substantial renovation projects targeted towards office activities) remains unoccupied or undeveloped. Changes in office market conditions of the mid-1980s reduced the differential in office rents between the downtown core and peripheral areas, diminishing one of the prime attractions of South of Market to large office space users. During the mid-1980s, conversions in the area have continued to attract small office operations and design studios. While such activity has contributed to the changing character of South of Market, the area's transformation, in terms of employment, has been limited relative to the potential change when the large complexes are fully occupied.

In summary, the South of Market area east of Fourth Street remains an area in transition. Vacancies are high, and office development has slowed. Although the area is clearly no longer an industrial or distribution center, a few such establishments remain, contributing, along with unimproved streets, vacant lots and abandoned buildings, to the mixed character of the area. That roughness is part of an appeal to new businesses choosing the location. Most major new developments that have been in the planning process for a long time were under construction in 1987 (e.g., South Beach, parts of Yerba Buena Center, and areas in the Rincon Hill Plan area).

The South of Market area west of Fourth Street generally has not experienced the same degree of transformation as the area east of Fourth Street. The western South of Market continues to be the location of choice for many smaller service, sales and light-industrial businesses. Auto repair establishments, restaurant suppliers, plumbing contractors, small print shops, and small machine shops have been joined by graphic designers, small office establishments, businesses related to film and video production, restaurants and bars, and others seeking close-in, affordable space and a "South-of-Market" image. Office expansion has had an effect indirectly as the area has become desirable to businesses relocating from more central locations. There has been upward pressure on rents in the area.

Generally, there is a higher degree of occupancy than in areas further east that have experienced more office development and conversion. Most buildings are small and can serve a variety of different uses. There appears to be continuing demand for such flexible, low-rent space. There also is on-going turnover as small businesses expand, start up or go out of business.

As discussed in VI.A. Public Plans, Policies and Permits, p. VI.A.9, the South of Market area generally west of Third Street and north of Brannan has been the subject of regulations restricting new office development and conversions./20/ Proposed South of Market rezoning would reserve most space in that area for services, light industrial and housing uses. Office use opportunities would be limited and hotel development would not be allowed. Anticipated amendments to the proposed South of Market Plan could further restrict office development opportunities by expanding the Service-Light Industrial district, where offices would not be permitted, to include more blocks along Townsend Street.

Showplace Square. This part of the larger South of Market area is zoned for industrial uses (M-1 and M-2). Showplace Square has become a major regional center for interior design and furnishings industries. Beginning in the late 1970s, the wholesale furniture showrooms that had been clustered in Jackson Square and the Northeast Waterfront relocated to the Galleria and Showplace Design Centers developed in large, vacant brick warehouse and industrial spaces south of Division Street at the foot of Potrero Hill. Wholesale showroom activity has expanded rapidly in the area, mostly through the rehabilitation of existing structures, with some low-rise new construction. The area has established a strong identity, and the level of activity has increased with expansion of the types of goods exhibited (office furniture, jewelry, gifts, in addition to home furnishings, fabrics, and fixtures) and the scheduling of trade marts and special events.

Ancillary activities have moved into Showplace Square to take advantage of proximity to customers and related businesses. They include furniture repairers and restorers, fabric designers, caterers, large-scale retail showrooms, and factory outlets. A 275-room hotel with meeting rooms and associated trade show space is planned to capitalize on the new identity for this corner of the South of Market area.

Showroom expansion northwards into the central South of Market area would be restricted in the proposed South of Market Plan (see VI.A. Public Plans, Policies, and Permits, p. VI.A.9). Generally, expansion has been towards older industrial areas away from the Downtown & Vicinity. For example, the adjacent North Potrero area offers large buildings for rehabilitation/conversion and larger lots attractive to showroom/trade mart uses. Much recent growth in the North Potrero area has been due to expansion of showroom activities as well as benefits of proximity to a successfully revitalized area.

North Potrero / Potrero Hill/21/

The North Potrero / Potrero Hill Areas, while adjacent to the Mission Bay Project Area, are set somewhat apart by the CalTrain tracks along Seventh Street and the I-280 freeway. North Potrero, along with Mission Bay and Lower Potrero / Central Bayfront, is subject to the City's Central Waterfront Plan of 1980 (see p. VI.A.2). North Potrero is zoned M-2, for heavy industry (i.e., large operations served by rail or water transportation); the industrially zoned areas of Potrero Hill to the south of 17th Street are designated M-1, for light-industrial uses, as the transition is made to a residential district.

Manufacturing and transportation-related businesses remain a dominant presence in North Potrero / Potrero Hill. Manufacturing activity has changed from metal products and ship repair to food and beverage products and apparel. Recent public and private sector investment in both large and small manufacturing facilities has contributed towards stabilizing employment in the area after 10-15 years of decline. North Potrero's large lots and shed structures near freeway access routes and major thoroughfares continue to be suitable locations for businesses in the transportation sector (bus and truck transportation).

While some processing plants remain, notably food and beverage processing, and paint and chemicals operations, most heavy industrial activity that once operated in North Potrero / Potrero Hill is gone. The inefficiency of the increasingly congested central city location, the design of old facilities compared to alternatives (e.g., new industrial parks), as well as changes in production and distribution methods contributed to the decline of heavy industrial activity.

Activities new to North Potrero / Potrero Hill in the past few years have occupied space vacated by larger manufacturing and distribution businesses. Wholesale showroom uses similar to those in the adjacent Showplace Square area have filled some of the rehabilitated or reconstructed buildings. Other buildings are occupied by a mix of small offices and showrooms. The construction trades use buildings and lots in North Potrero / Potrero Hill for office functions, equipment and materials sales and distribution, as well as storage and staging. Smaller structures house a variety of warehouse/distribution operations and commercial services whose markets are the Downtown & Vicinity and other nearby San Francisco areas. North Potrero / Potrero Hill also has attracted architects, designers, artisans, and others involved in creative or crafts-oriented sectors of San Francisco's economy, looking for low-cost, centrally located space.

With the loss of major shippers/receivers, much rail freight service was discontinued in North Potrero / Potrero Hill. Some tracks are inaccessible or have been paved over. A few older establishments continue to use freight rail service, although shipments have declined.

Lower Potrero / Central Bayfront/22/

Lower Potrero / Central Bayfront is adjacent to the Mission Bay Project Area south of Mariposa Street. In addition to M-2 industrial areas, Lower Potrero contains a small residential neighborhood. The Central Bayfront area (zoned M-2) extends from Third Street on the west to the Bay and south to Islais Creek. Much of the land in the Central Bayfront is owned by the Port of San Francisco or is under Port jurisdiction.

The types of businesses in Lower Potrero / Central Bayfront have changed over time. The decline in maritime activity and maritime-related industries has had a telling effect since the bayfront was dominated by shipbuilding and repair activities, steel and machinery production, and large processing plants (e.g., sugar refineries) needing to be near water. For many years, much bayfront property east of Third Street has remained underutilized.

In the mid-1980s, there were a few large business operations in Lower Potrero /Central Bayfront, most on publicly owned land, or land under Port of San Francisco jurisdiction. At the far southern edge, the Port's container and combination cargo operations begin at Pier 80 and extend south to Piers 90 to 96. The PG&E Potrero Power Plant dominates the landscape east of Third Street between 22nd and 23rd Streets. A former ship repair facility operated just south of the Mission Bay Project Area. The San Francisco MUNI Railway maintains a large presence at the John M. Woods Motor Coach Center and associated storage and maintenance facilities occupying three large blocks west of Third Street, and a large lot at Pier 70 used for street car and bus storage.

Two large facilities have been upgraded by private investors. The American Industrial Center, in the old American Can Company facility on Third Street between 20th and 23rd, is now a light-industrial complex with about 300 tenants. Space is leased to garment-makers, photographers, warehousing companies, architects, crafts workers, and others. The building housed artists in live-work studios until the owners decided to make the space available for business use only. Esprit, an apparel manufacturer, has its headquarters office, design and distribution facility in a complex encompassing some three city blocks along Minnesota Street.

Aside from those few large operations (some representing historical activities at the bayside location, others representing new types of investment in the area), Lower Potrero / Central Bayfront exhibits a wide range of uses and levels of activity. As in North Potrero / Potrero Hill, transportation and distribution activities are mixed with contractors, construction suppliers, small manufacturers and artisans, storage uses, and some small office activity. There are vacant sites and empty, deteriorated structures in the area; but there also are light-industrial structures of relatively recent construction used by a variety of transportation, service, production, and distribution businesses, particularly in the southern end of the district. A few small retail and restaurant establishments are located along Third Street.

Overall trends in employment and levels of activity in Lower Potrero / Central Bayfront are similar to those in North Potrero / Potrero Hill. Employment in manufacturing and maritime sectors has declined as large facilities have closed or cut back on work. The continued presence of transportation and distribution establishments and some maritime sales and service operations, in addition to growing activity of small manufacturers and artisans, has offset some of the decline.

Inner Mission

The Inner Mission contains an older industrial district, sometimes referred to as the Northeast Industrial Zone. There are a few relatively large old industrial/ processing facilities still in operation handling a variety of products including apparel, building materials and food. Warehousing, distribution, vehicle maintenance, and storage uses are well-represented. These include a large PG&E service center and MUNI facilities. Smaller buildings house both older industrial uses as well as new types of manufacturing, sales and service businesses. Larger-scale structures have recently been constructed and renovated in the area.

Rail service to the area was an important factor in its development as an industrial district. Almost all rail operations have ceased, though tracks and large open areas associated with rail use remain. One large food-products manufacturer (Best Foods, Inc.) continues to use rail service.

Showplace Square development has had some impact on the Inner Mission. Most notably, Hamm's Brewery has been converted to a Food Service Trade Center. Other Showplace-related businesses west of Potrero Avenue include fabrics and textile sales and showrooms, antique furniture sales and repair, and business furniture sales.

South Bayshore

The South Bayshore industrial area, about one mile from the southern boundary of Mission Bay, extends from Islais Creek to the County line. It is a large area with distinct industrial districts, including India Basin Industrial Park, the Produce Market, Port facilities at Piers 90 to 96, older industrial zones near Candlestick Park, and Hunters Point Naval Shipyard. Industrial, warehousing and distribution activities are the primary non-residential uses of the area.

Much land in the industrial areas south of Army Street is covered with one-story warehouse/loading sheds. Expansive flat land between U.S. 101 and Third Street houses auto wrecking, salvage and other open air uses such as construction materials storage. The City also uses land here for vehicle storage and repair and institutional activities. Private investment in new facilities has been limited. Most new development has been accomplished through the San Francisco Redevelopment Agency at India Basin Industrial Park. A variety of businesses have occupied light-industrial buildings, using space for production, distribution, showroom, and office activities.

Further to the south, on either side of Third Street, the level of commercial and industrial activity declines. Facilities are generally smaller scale. Many are unused and deteriorating. There is some evidence of new activity as smaller distributors, manufacturers, artisans, and transportation services are moving in where metal and food products, machinery, and furniture manufacturing once operated. Often those new activities (sometimes referred to as "boutique-style" firms) locate in clusters in an old building.

Maritime Activities and the Piers Adjacent to the Project Area

Overview of Port Facilities and Waterfront Activity. The Port of San Francisco manages several thousand acres of bayfront property extending approximately 7.5 miles from Aquatic Park in the north to Hunters Point in the south. Over time, much of the northern waterfront (from the Ferry Building north) has been converted to non-maritime uses such as retail, restaurant and office, although the commercial fishing industry maintains an active presence at Fisherman's Wharf. The southern waterfront (from the Ferry Building south) remains the location for most maritime activities in San Francisco./23/ The Port's jurisdiction, authority and plans for the waterfront are described in VI.A. Public Plans, Policies and Permits, p. VI.A.16.

Between the commercial and tourist-oriented northern waterfront and the major container terminal facilities at the southern end of the waterfront (Piers 80 and 94-96), a variety of maritime and related activities take place./24/ The Port's finger piers offer warehouse and terminal space for break-bulk cargo as well as docking facilities for a herring fleet and tugboat operations. Ship repair and industrial storage and assembly are other uses of Port facilities along the southern waterfront. Generally the level of maritime activity is low; facilities and land are underutilized. Some piers along the southern waterfront have been turned over to non-maritime commercial/recreation uses. (See p. VI.A.18 for discussion of the Port's current capital improvement programs as they relate to the southern waterfront.)

Use of Port Property Adjacent to the Mission Bay Project Area./25/ Port property bordering the Mission Bay Project Area east of China Basin Street, from China Basin Channel to Central Basin, includes Piers 48 to 64 and adjacent seawall lots. Although the Port's major cargo activities take place further south at the container terminals (Piers 80 and 94 to -96), some piers adjacent to the Project Area handle non-containerized cargo. Pier 48 is a bulk paper terminal, handling newsprint exclusively. It is the Port's most active newsprint shipping facility, handling approximately 35% to 40% of the annual newsprint tonnage shipped to the Port. While annual average vessel calls to this pier have steadily increased over the past five years, the pier's average of 30 vessel calls per year represents less than 5% of total vessel calls to the Port in 1985./26/ Pacific Bell operates a base from Pier 48 for transbay cable laying and repair. Pier 50 (Mission Rock Terminal) is used for a variety of purposes. Its sheds are used as container freight stations for the transfer and re-packaging of coffee, meat products and other commodities. As of 1985, other sheds and open areas were used for assembly of new CalTrain passenger cars. This work was completed in 1986. A large drydock facility operated by Continental Maritime, Inc. for ship repair is the major use of Pier 50. Pier 52 formerly was used by the Atchison, Topeka and Santa Fe Railway Company (ATSF) rail barge; ATSF continues to hold the lease to the pier. Continental Maritime leases Pier 54 for additional ship repair facilities. Pier 64 is dilapidated and unused. The ship repair activity at Pier 50 is the only maritime activity on piers adjacent to Mission Bay that extends to land in the Project Area; Continental Maritime leases land west of China Basin Street for material storage and parking for employees.

There are other uses of Port property on the bay side of China Basin Street. The San Francisco Eye Institute operates a medical clinic and has several small office sub-tenants. Agua Vista Park provides public access to the bay and a fishing pier. There are two boat clubs and several small boat repair operations, as well as a public boat launching ramp just south of Pier 50. Mission Rock Resort, Olive Oil's, and The Ramp are popular bayfront eating places.

Most operations east of China Basin Street adjacent to the Project Area are small, employing fewer than 20 workers. Continental Maritime is the largest employer though the number of workers at Piers 50 and 54 fluctuates dramatically, depending on the frequency and nature of the firm's ship repair contracts.

As opposed to other Nearby Areas that have seen recent investment in new construction and rehabilitation, the piers adjacent to the Project Area have remained relatively untouched by non-maritime development activity. The ship repair drydock at Pier 50 was a relatively recent maritime investment. Many existing facilities continue to be used by generally small-scale maritime and related activities, consistent with Port priorities for the area.

JOB AND LABOR FORCE CHARACTERISTICS

This second major section describes the jobs in the Project Area, the Downtown & Vicinity, and Nearby Areas in terms of occupations and wages/salaries. In preceding sections, employment in those areas was defined and described in terms of business activity. The discussion below identifies the mix of occupations and earnings associated with jobs in each business activity./27/ The labor pool from which San Francisco employers draw workers also is described.

Characteristics of Jobs in the Mission Bay Project Area

In general, there is considerable mix of occupations in the Project Area (see Table VI.B.12). The largest single occupational category is the "operative" category. Most of those jobs are in the industrial business activity, primarily truck drivers (including independent owner-operators) and delivery workers. The next largest occupational group is the sales category. One large establishment (the Esprit Store) accounts for the majority of those jobs. There are about equal proportions of jobs in managerial and clerical occupations. They are primarily management and associated record-keeping jobs throughout the many different types of establishments in the Project Area. There are a substantial number of jobs in the "other" occupational category, primarily representing workers in warehouses, movers and inventory/stock clerks. The smallest occupational categories are skilled crafts, services and professional/technical. Most of those jobs are in businesses classified as industrial.

Although most jobs of all types are in the industrial business activity, the occupational distribution of jobs in each business activity is different and reflects the primary business function associated with each activity. Jobs in the "operative" and "other" occupational categories dominate in industrial activities, along with associated administrative and management positions. Clerical, sales and skilled crafts occupations also are relatively important in that business activity. Management, clerical and sales occupations characterize the office business activity. The relatively low proportion of professional/technical jobs compared to managerial and sales jobs reflects the nature of

TABLE VI.B.12: OCCUPATION AND WAGE/SALARY DISTRIBUTIONS FOR JOBS IN MISSION BAY, 1985

Categories	Total Mission Bay Project Area Jobs/a/		Percent Distribution for Business Activities			
	Number	Percent	Industrial/b/	Office	Retail/c/	Arts/Design/Other
Occupational						
Professional/Technical	69	3.5	3	15	--	33
Managerial/Administrative	221	11.0	10	27	10	13
Clerical	235	11.7	11	24	12	--
Sales	385	19.2	10	20	68	13
Service	101	5.1	4	1	10	29
Skilled Crafts	122	6.1	7	6	--	12
Operatives	696	34.7	44	7	--	--
Other	175	8.7	11	--	--	--
TOTAL	2,004	100.0%	100%	100%	100%	100%
Annual Wage and Salary (1985 Dollars)						
Less than $15,000	488	24.3	17	22	63	54
$15,000-24,999	649	32.4	33	39	30	25
$25,000-49,999	803	40.1	47	23	7	21
$50,000-74,999	49	2.4	2	14	--	--
$75,000 and above	15	0.8	1	2	--	--
TOTAL	2,004	100.0%	100%	100%	100%	100%
TOTAL JOBS BY BUSINESS ACTIVITY	2,004		1,581	106	293	24

NOTE: The occupation and wage/salary distributions shown in the table are the results of the Mission Bay Project Area Business Survey conducted by Recht Hausrath & Associates in 1985 (see Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.1-XIV.B.3). The information was collected as part of employer interviews. The detailed results by business activity are presented to highlight differences among groups. The overall pattern is more accurate than any one percentage.

/a/ Total jobs include both full-time and part-time positions.

/b/ The industrial business activity group includes: transportation and related services, wholesale/distribution/warehouse, vehicle/equipment storage, and manufacturing/construction. These activities have similar characteristics.

/c/ The retail business activity includes both retail stores and restaurants. The largest establishment did not provide wage and salary information, so the wage and salary distribution shown here for retail reflects only the combined results for the small restaurants and coffee shops in the Project Area and one other small retail establishment.

SOURCE: Recht Hausrath & Associates

small independent offices located in the Project Area. Several are involved in import/export and cargo consolidation activities. They are different from professional services offices, primarily located in the downtown core. The retail business activity is dominated by sales occupations, as expected. The arts/design/other business activity is a mix of artists/designers (professional/technical occupations) and managerial, sales, skilled crafts, and service occupations associated with the SFRV Park and the Channel Street Pump Station.

Table VI.B.12 also shows the distribution of Project Area jobs by wage and salary category in 1985. Overall, wages and salaries tend to cluster in the $15,000 - $49,999 range, with 72% of the jobs in this group. Jobs paying less than $15,000 account for 24% of all jobs in the Project Area (including many part-time positions), while those paying $50,000 and more account for 3% of total jobs.

There are differences in the distribution of jobs by wage and salary category across the four business activity groups. Industrial activities have the highest percentage of jobs in the higher-wage categories ($25,000 and above). That may reflect wages set by union agreements. Jobs in the office business activity cover the full range of wage and salary categories. More than half of the jobs in the retail business activity are at the lowest end of the wage and salary scale. Many of those are part-time jobs. The relatively small number of jobs in the arts/design/other business activity are somewhat higher-paying than retail jobs, but fall near the lower end of the range.

Characteristics of Jobs in the Downtown & Vicinity

Table VI.B.13 presents occupation and wage/salary distributions for jobs in the Downtown & Vicinity excluding Mission Bay.

Occupations

In general, professional/technical and clerical occupations dominate, with about 50% of all jobs in the Downtown & Vicinity in those categories. The largest single category is clerical. The managerial and administrative category also is relatively large. While other occupational categories each account for less than 10% of total jobs in the Downtown & Vicinity, there are 20,000 to 30,000 workers in each category.

TABLE VI.B.13: OCCUPATION AND WAGE/SALARY DISTRIBUTIONS FOR JOBS IN THE DOWNTOWN & VICINITY EXCLUDING MISSION BAY, 1985

Categories	Total Jobs in the Downtown & Vicinity Excluding Mission Bay/a/ Number	Percent	Percent Distribution for Business Activities: Office	Retail	Hotel	Sales/Showroom	Cultural/Institutional/ Educational	All Others/b/
Occupational								
Professional/Technical	84,280	24.8	31	1	4	3	45	4
Managerial/Administrative	62,360	18.3	21	9	3	21	19	10
Clerical	97,930	28.8	35	4	18	23	27	9
Sales	24,680	7.3	3	45	2	38	--	5
Service	31,160	9.2	2	39	68	1	7	21
Skilled Crafts	19,990	5.9	3	1	4	10	1	33
Operatives/Other	19,330	5.7	5	1	1	4	1	18
TOTAL	339,730	100.0%	100%	100%	100%	100%	100%	100%
Annual Wage and Salary (1985 Dollars)								
Less than $15,000	74,810	22.0	18	57	62	17	31	10
$15,000-24,999	99,100	29.2	27	35	27	32	29	39
$25,000-49,999	122,750	36.1	40	8	10	31	36	45
$50,000-74,999	29,180	8.6	10	--	1	17	4	5
$75,000 and above	13,890	4.1	5	--	--	3	--	1
TOTAL	339,730	100.0%	100%	100%	100%	100%	100%	100%
TOTAL JOBS BY BUSINESS ACTIVITY	339,730		249,740	28,910	12,240	4,550	10,970	33,320

NOTE: The C-3 District and South of Market/Folsom Employer Surveys conducted by Recht Hausrath & Associates in 1981 and 1982 provided occupation and wage/salary characteristics for downtown business activities that were used to develop the estimates presented in the table. The survey results were supplemented by other information for business activities not well covered by the survey sample. The California Employment Development Department survey Occupations in Selected Industries, San Francisco City and County (September 1981) was one supplemental source. Stan Smith, Secretary-Treasurer, San Francisco Building and Construction Trades Council, provided information on construction employment.

The information in this table is intended to highlight differences between groups. The overall pattern is more accurate than any one percentage.

/a/ Total jobs include both full-time and part-time positions.
/b/ "All others" include services, distribution, manufacturing, building maintenance/security, and construction business activities.

SOURCE: Recht Hausrath & Associates

Comparing the occupational mix of jobs among business activities reveals both differences and similarities in functions performed by each. For example, while most office jobs are in professional/technical, managerial/administrative and clerical occupations, other business activities also have some jobs in those categories; most businesses require some form of managerial, clerical or bookkeeping function. Similarly, service, skilled crafts, "operative", and other labor occupations are primary components of the "all others" category (consisting of services, distribution, manufacturing, building maintenance, and construction business activities), but jobs of those types are required to some degree in other business activities as well. In fact, the number of jobs in skilled crafts, "operative" and other labor occupations is larger in the office business activity than it is in the "all others" category that represents businesses sometimes considered the primary source of "blue-collar" employment.

Wage/Salary Distribution

Overall, about half of the jobs in the Downtown & Vicinity are in lower wage/salary categories (less than $25,000/year) (see Table VI.B.13, p. VI.B.41). The largest single category, with 36% of the workers, is $25,000-$49,999. Twelve percent of workers in the Downtown & Vicinity earn $50,000 or more per year.

The wage/salary distribution varies among the business activities. Both retail trade and hotel have the highest percentages in the lowest wage categories, reflecting the relatively large number of part-time jobs in those industries, as well as the predominance of service jobs with few experience or education requirements. The sales/showroom business activity has the highest percentage of jobs in the higher wage/salary categories, though the number of workers in those categories are considerably smaller than the number of higher-paid office workers. Wage/salary distributions for office and "all others" are similar. In both groups, 45-50% of the jobs are in the under $25,000 categories, although there are proportionally more office jobs at the lowest end of the range (under $15,000). Office functions use part-time workers, partially explaining the higher share of jobs in the lowest wage category. In contrast, a large share of the jobs in manufacturing and construction activities are relatively high-wage positions with substantial skill and experience requirements.

Job Opportunities

Combining information about business activities, occupations and wages and salaries results in a generalized assessment of experience and education levels associated with job opportunities in the Downtown & Vicinity. Generally, jobs with wages/salaries of less than $15,000 can be considered entry-level positions without specific education and experience requirements. Jobs in the $15,000 to $24,999 range include entry-level positions where some education or training may be required as well as the next rank of jobs for initially unskilled workers who have gained experience and skills in a lower-wage, entry-level position.

About 20% of all jobs in the Downtown & Vicinity have wages/salaries of less than $15,000. Some are part-time jobs; most are entry-level positions. Most are clerical jobs primarily in office business activities, but spread among other business activities as well. Most of the rest of the lowest-paying entry-level jobs are in sales, service, crafts, and "operative" occupations in office, retail, hotel, sales/distribution, services, and manufacturing business activities.

There are more jobs in the $15,000-$24,999 wage/salary category (about 30% of all jobs in the Downtown & Vicinity). The group includes a large number of clerical office jobs and jobs for entry-level professionals and administrators as well as sales, lower-level management, and semi-skilled crafts, "operative" and laborer positions in most other business activities.

Almost 50% of all jobs in the Downtown & Vicinity pay wages and salaries of $25,000 and more. The professional/technical and managerial/administrative occupations in office and cultural/institutional/educational business activities appear predominantly in jobs paying $25,000 and more. Higher-paying jobs are not limited to white-collar occupations or office jobs, however. Both crafts and sales occupations also are represented in higher paying jobs, reflecting relatively high wages paid for experienced, senior, skilled crafts-workers, relatively high construction wages, and relatively high levels of compensation for entrepreneurs in the wholesale showroom industry.

Comparison of Jobs in the Downtown & Vicinity to Jobs in the Rest of the City

The mix of types of jobs in the Downtown & Vicinity (including Mission Bay) is different from the mix in the rest of the City, reflecting the distribution of business activities throughout the City. Table VI.B.14 shows the distribution of jobs by occupation for the Downtown & Vicinity, the rest of the City and the total City. The distribution of jobs in

TABLE VI.B.14: COMPARISON OF THE DISTRIBUTION OF JOBS BY OCCUPATION FOR THE DOWNTOWN & VICINITY AND THE REST OF THE CITY, 1985

	Percent Distribution for Parts of the City		
Categories/a/	Downtown & Vicinity/b/	Rest of City/c/	Total City/d/
Occupational			
Professional/Technical/ Managerial	43	29	37
Clerical/Administrative Support	29	21	26
Sales	7	14	10
Service	9	15	12
Crafts	6	9	7
Operatives/Other	6	12	8
TOTAL	100%	100%	100%

/a/ In 1980 Census data on the occupations of workers by Place of Work, managerial occupations are combined with professional occupations. Administrative support and clerical occupations also are combined. The categories in the table reflect the Census groupings. For the Downtown & Vicinity estimates, jobs in the managerial / administrative occupational category have been combined with professional/technical jobs. Some administrative jobs should be combined in the clerical / administrative support category, but the survey data cannot be broken down any further. The resultant potential overestimate of professional / technical / managerial jobs in the Downtown & Vicinity and underestimate of clerical / administrative support jobs is not critical to the analysis.

/b/ The distribution for the Downtown & Vicinity represents the sum of the occupation distributions in Table VI.B.12, p.VI.B.39 (Mission Bay Project Area) and Table VI.B.13, p.VI.B.41 (Downtown & Vicinity excluding Mission Bay).

/c/ The distribution for the rest of the City was derived by subtracting the estimates of jobs by occupation for the Downtown & Vicinity from the estimates of jobs by occupation for the total City (see note /d/).

/d/ U.S. Census of Population, 1980, Place of Work, Table 1, "Characteristics of Workers by Place of Work for Counties." The distribution of workers by occupation from the 1980 Census was applied to the 1985 estimate of total City employment to derive estimates of employment by occupation for the total City. Subtracting estimates of employment by occupation for the Downtown & Vicinity from estimates for the total City results in estimates for the occupational mix of employment in the rest of the City (see note /c/).

SOURCE: Recht Hausrath & Associates

the Downtown & Vicinity is more heavily weighted towards professional/technical, managerial and clerical occupations than is the distribution for the rest of the City. The relatively high percentage of sales and service occupations among jobs in the rest of the City reflects the preponderance of retail trade, health services and institutional uses outside the Downtown & Vicinity. Crafts, "operative" and "other laborer" occupations are also relatively more important to the composition of jobs in the rest of the City than in the Downtown & Vicinity. That is partially explained by the concentration of San Francisco's industrial activity in southern parts of the City beyond the Downtown & Vicinity. Some of those jobs are in areas designated Nearby Areas in this EIR. Most are in businesses located further to the south beyond Islais Creek.

Historically, "blue-collar" industries in San Francisco provided opportunities and job security for the City's working-class population. Demographic changes and changing economics of industrial activities have altered the character of those job opportunities. While some traditional "blue-collar" industries continue to operate on the periphery of the Downtown & Vicinity and in areas to the south of Mission Bay, a variety of small businesses are starting up and expanding in older, low-rent space in those areas. Small firms with primarily professional/ technical positions and opportunities for entrepreneurs are a growing source of jobs in these parts of the City.

The Labor Pool

City Jobs Attract Labor from Throughout the Region

Businesses in San Francisco employ workers from throughout the region. As shown in Table VI.B.15, about half the jobs in San Francisco employ City residents and about half employ people residing elsewhere in the region, although there is some variation for jobs in the Downtown & Vicinity versus those located in the rest of the City. Generally, jobs in the Downtown & Vicinity employ proportionally more San Francisco residents and proportionally fewer residents from other counties than do jobs in the rest of the City. That reflects differences in types of jobs and types of labor they require as well as differences in location and access from place of residence to place of work./28/

City Jobs Employ a Large Share of City Residents

San Francisco residents working in the City represent a very high percentage of all San Franciscans who work: more than 80%, as shown in Table VI.B.16. That high percentage

TABLE VI.B.15: SOURCES OF LABOR FOR SAN FRANCISCO JOBS, 1985

	San Francisco		Downtown & Vicinity Including Mission Bay		Rest of the City	
	Number	Percent of Jobs	Number	Percent of Jobs	Number	Percent of Jobs
TOTAL JOBS	584,900	100%	341,730	100%	243,170	100%
Jobs Held by San Francisco Residents/a/	305,820	52%	196,790	58%	109,030	45%
Jobs Held by Persons Residing Elsewhere in the Region/a,b/	279,080	48%	144,940	42%	134,140	55%

NOTE: The table presents estimates developed for 1985 to be consistent with employment estimates in preceding sections. The forecasting analysis used 1980-1981 as a starting point because Census data and survey results are available for those years. The 1980 Census data also provide continuity with previous Census data and are useful in analyzing trends. Although the 1985 estimates are more approximate, the patterns and relationships they reflect are the same for both analysis years.

/a/ The 1985 estimates are updates of data from the 1980 Census and from surveys conducted in the C-3 District in 1981 and the South of Market area in 1982 by Recht Hausrath & Associates. The updates are based on 1985 employment figures from the California Employment Development Department (EDD) and 1985 estimates of population and households from the California Department of Finance (DOF). Compared to the 1980-1981 data, the 1985 estimates show a slightly higher percentage of jobs held by City residents and a lower percentage held by persons residing elsewhere in the region. The difference reflects the fact that, from 1980-1981 through 1985, population increased in San Francisco while the number of jobs declined. See Appendix C. Housing and Population, pp. XIV.C.12-XIV.C.14, for more discussion of the 1980-1981 and 1985 data.

/b/ Includes a small number of persons working in San Francisco who reside outside the nine-county Bay Area Region.

SOURCE: Recht Hausrath & Associates

TABLE VI.B.16: REGION'S EMPLOYED RESIDENTS AND PROPENSITY TO WORK IN SAN FRANCISCO, 1985

	San Francisco		Rest of Counties in Region/a/	
	Number	Percent of Employed Residents	Number	Percent of Employed Residents
TOTAL EMPLOYED RESIDENTS/b/	372,050	100%	2,475,600	100%
Residents Who Work in San Francisco/c/	305,820	82%	279,080 /d/	11%
In the Downtown & Vicinity, Including Mission Bay/c/	196,790	53%	144,940 /d/	6%
In Rest of City/c/	109,030	29%	134,140 /d/	5%
Residents Who Work Outside San Francisco	66,230	18%	2,196,520	89%

NOTE: The table presents estimates developed for 1985 to be consistent with employment estimates in preceding sections. The forecasting analysis used 1980-1981 as a starting point because Census data and survey results are available for those years. The 1980 Census data also provide continuity with previous Census data and are useful in analyzing trends. Although the 1985 estimates are more approximate, the patterns and relationships they reflect are the same for both analysis years.

/a/ Includes Marin, Sonoma, Alameda, Contra Costa, Solano, Napa, San Mateo, and Santa Clara counties.

/b/ Estimates are based on the California Department of Finance (DOF) estimates of households by county as of the end of 1985 and the ratios of employed persons per household by county for 1985 from ABAG, Projections '85.

/c/ The 1985 estimates are updates of data from the 1980 Census and from surveys conducted in the C-3 District in 1981 and the South of Market area in 1982 by Recht Hausrath & Associates. The updates are derived from 1985 employment figures from the California Employment Development Department (EDD) and 1985 estimates of employed population described in note /b/ above. Compared to the 1980-1981 data, the 1985 estimates show a slightly lower percentage of San Francisco's employed residents working in the City and a lower percentage of the rest of the region's employed residents working in San Francisco. The difference reflects the fact that from 1980-1981 through 1985, the number of employed residents increased in San Francisco and in the rest of the region while the number of jobs in the City declined. See Appendix C. Housing and Population, pp. XIV.C.12-XIV.C.14, for more discussion of the 1980-1981 and 1985 data.

/d/ Includes a small number of persons working in San Francisco who reside outside the nine-county Bay Area region.

SOURCE: Recht Hausrath & Associates

indicates the importance of City jobs in providing employment for City residents. Of those residents who work, more than half work in the Downtown & Vicinity and about 30% work in the rest of the City. Less than 20% work outside the City.

Those who work in San Francisco and live outside the City represent a relatively small percentage (about 10%) of the labor force residing throughout the rest of the region. The percentage is relatively small because of the larger numbers of jobs and employed residents in the rest of the region. Of the total employed residents in the rest of the region, about 6% work in the Downtown & Vicinity and about 5% work in the rest of the City. Jobs in San Francisco draw a larger number of workers from nearby counties that offer proximity and accessibility to the City, than from distant counties. Nearby counties are San Mateo, Marin, Alameda, and Contra Costa./29/

The Unemployed in the Labor Pool

San Francisco employers draw labor from a pool of people that includes those already employed (who seek advancement, a change in career, a job change for better earnings, different hours, a different work location, etc.) and others potentially employable. In San Francisco, the size of the resident labor pool is in the neighborhood of 55% of the population or approximately 400,000 people./30/ In the rest of the region, the resident labor pool includes more than 2.5 million people./31/

The labor force consists of people who are working as well as people who are currently unemployed and looking for work. That is the definition used by the U.S. Department of Labor in labor force and unemployment statistics. Unemployment statistics for San Francisco and the region overall indicate that the unemployment rate (comparing the number of unemployed to the total number of persons in the labor force) hovers around 6%./31/ In addition, there are people not in the labor force who want to work but do not look for a job because they think they cannot find one. Such people are typically referred to as "discouraged workers." While not included among the unemployed because they are not actively seeking work, they are potentially available for employment and may be included within a broader definition of the labor pool.

There are many reasons why people in the labor pool are not employed. Some may have lost their jobs due to lay-offs or firings and others may have quit voluntarily to seek other employment. People new to the area may have just begun looking for work, and others may have just entered or re-entered the labor force. Some unemployment is "transitional," in that it results as people move in and out of the area, change jobs within the area, or move in and out of the labor force. Unemployment also arises because of a lack of education, training, experience, or language skills, reasons that are problematic and may result in longer-term unemployment. They also may discourage people from continuing to look for work.

A recent study of San Francisco's labor pool uses Census and other data from government reports to identify the characteristics of the unemployed compared to the employed./32/ The data indicate the following:

- Employed persons of both sexes have higher levels of educational attainment than unemployed persons. On average, educational levels for the unemployed are above high-school level, however. That pattern holds true for the City and the region.
- There are differences in employment status among races. In general, whites and Asians have higher percentages employed and lower percentages unemployed than do blacks or Hispanics. Although San Francisco is more heavily populated by minorities than the region as a whole, relative rates of employment and unemployment by racial group do not differ significantly between the City and the region.
- Age also is a factor in employment status. Generally, labor force participation peaks between ages 20 and 40, and then declines to age 65 when it falls off substantially. However, in spite of that pattern, unemployment is higher in the youngest age groups. The pattern applies for the City and the region.

The health of the economy affects employment and unemployment. Increased economic activity results in employment growth, lower unemployment rates, and opportunities for advancement. National data indicate that, over time, unemployment rates decline in periods of economic expansion. Labor force participation also may increase as people are attracted back to the work force by increasing job opportunities. A decline in unemployment rates indicates, in both an absolute and relative sense, that more people are employed./33/

While job growth clearly provides employment benefits, job growth alone does not solve all problems of unemployment. Those looking for work who have the desired skills are most likely to benefit from employment growth. Others may not benefit because they do not have the skills needed for the opportunities that exist. There are educational and training problems that may need special attention. There also may be social and cultural factors that act as barriers and limit opportunities available to some individuals.

FUTURE CONTEXT

This section presents the future context for business activity, employment and land use in the Downtown & Vicinity, the rest of the City, and the region. These are the scenarios of future growth and change in addition to that in the Project Area that are the subject of the cumulative impact analyses in this EIR. Chapter IV. Study Approach and Organization, p. IV.3, describes the rationale for the cumulative impact analyses and, on pp. IV.7–IV.11, discusses the purposes of the cumulative growth scenarios used in this EIR.

Chapter V. The EIR Alternatives and Approval Process, pp. V.33–V.38, identifies future land use, business activity and employment for each Alternative within the Project Area. This future context section identifies the companion scenarios for land use, business activity and employment for areas outside the Project Area.

The future context scenarios are necessary because the Downtown & Vicinity, the rest of the City, and the region will grow and change over time and the Project Area Alternatives would have different effects on that growth and change, depending on the land uses accommodated in Mission Bay.

The following discussion identifies general trends reflected in the downtown, citywide and regional forecasts. Those generalized economic conditions are common to the future for areas outside the Project Area under all Mission Bay Alternatives. However, because the Mission Bay Alternatives would have impacts outside the Project Area, i.e., on growth and development in Nearby Areas, on total employment in the City and on regional development patterns, the future scenario associated with each Project Area Alternative is different.

Consequently, in this future context section, different sets of numbers are presented as the scenarios for the future under each Alternative, incorporating the different effects of each Mission Bay Alternative on future conditions outside the Project Area. Those differences are defined as the land use and employment impacts of the Project Area Alternatives on development and employment growth outside the Project Area (in Nearby Areas, the rest of the City, and the rest of the region) and are described in the Impact section, beginning on p. VI.B.106.

Two time periods are discussed here: an analysis of build-out (2020) of Mission Bay Alternatives and an interim analysis at the year 2000. Chapter IV. Study Approach and Organization, pp. IV.7-IV.9, and describes the rationale for and selection of the two analysis years.

This future context section focuses on economic activity, employment and associated land use changes for the Downtown & Vicinity, the total City, and the region as a whole. The future context for households and population is presented in VI.C. Housing and Population, beginning on p. VI.C.38. Although described in a separate section, those population forecasts were developed and are consistent with the forecasts for land use and employment; each describes a different aspect of the same future context. Together, the two sets of forecasts provide background for analysis of local impacts associated with the Mission Bay Alternatives and identify the scenarios of growth in addition to Mission Bay analyzed in the cumulative impact assessments throughout the EIR.

COMMENTS ON APPROACH AND FORECASTS

The economic analyses for these forecasts included studies of: recent employment trends and historic development patterns; key factors affecting employment growth and location decisions of various types of firms; geographic areas competitive with San Francisco; and other forecasts. The economic forecasting methodology is based on a conceptual framework of the process of urban economic growth and development. The analyses incorporated the best available data and information on past, current and likely future conditions and trends for economic, real estate, demographic, and public-policy factors. Appendix B. Land Use, Business Activity, and Employment, pp. XIV.B.17-XIV.B.36, provides background on the economic forecasting approach and methodology and identifies data sources.

The forecasting approach is similar to that used in the Downtown Plan EIR./34/ The economic analyses and forecasts in this EIR are updated and expanded versions of those in the Downtown Plan EIR. The area of primary focus has been expanded beyond the C-3 District (the subject of the Downtown Plan EIR) to include South of Market, Northeast Waterfront, Civic Center/South Van Ness and Mission Bay. The economic analyses and forecasts from the Downtown Plan EIR have been updated to incorporate recent economic trends and changes in outlook since 1981/82 as well as changes in public policies affecting development.

Four aspects of the forecasting approach are described below to help explain what the numbers represent and how they can be used.

First, the economic forecasts used to define the future context are long-term forecasts developed for certain benchmark years (2000 and 2020). Forecasts such as those reflect long-term patterns of economic change (growth or decline) and are not sensitive to short-term construction or business cycle conditions./35/

Second, the forecasting approach focuses on economic trends and potentials. Economic activity and employment are the primary measures of growth used in the analysis. Once developed, forecasts for employment growth provide the means for considering the timing and amount of additional building space to be absorbed (occupied) by additional workers./36/ Together, the forecasts of employment and the companion forecasts of changes in occupied space represent a forecast of absorption./37/ Absorption is simply a term to describe the process by which cumulative growth occurs. The economy grows (as measured in terms of employment); employment growth represents demand for additional building space; additional space occupied by businesses is considered to be absorbed.

Third, future economic growth will be affected by growth of the labor force. The labor force is expected to grow more slowly in the future than in the past, contributing to slower economic growth at national, regional and local levels. The location of the labor force within the region will continue to support growth of economic activities in more outlying locations and relatively slower growth in central locations like San Francisco. Analysis of growth of the large labor force in San Francisco and in parts of the region in closer proximity provided assurance that the employment forecasts are reasonable, given that jobs in San Francisco compete for labor from throughout the region./38/

Fourth, in developing the forecasts consideration also was given to the transportation system serving San Francisco and its ability to handle increased numbers of commuters. It was assumed that the transportation system would not constrain San Francisco employment growth. In other words, although travel times would increase and changes in commute modes would be needed, absolute limits on capacities of systems or on people's willingness to travel under those conditions were not assumed. The transportation and housing chapters consider the implications of the resultant employment growth scenarios.

The transportation analysis indicates that if capacity and service improvements did not occur or if commuters were unwilling to further modify their travel behavior, then employment growth could be less than forecast for this EIR. Also, transportation constraints could have more effect on where people live relative to where they work than assumed in the residence pattern forecasts described in VI.C. Housing and Population, p. VI.C.55. (See VI.E. Transportation, p. VI.E.91 for discussion of possible effects of transportation constraints on the growth scenarios.)

FUTURE SCENARIOS

2000

Downtown & Vicinity

Total employment in the Downtown & Vicinity including Mission Bay would range from about 439,900 jobs to about 444,300 jobs in 2000 depending on the Alternative (see Table VI.B.17). Employment growth in the Downtown & Vicinity from 1986 to 2000 would range from about 98,200 to about 102,500 depending on the Alternative. The forecasts represent an annual rate of employment growth of about 1.7% during the 15 years from 1986 through 2000. That rate of growth is slower than what occurred during the 1970s. However, it represents a resumption of growth after employment decline from 1981 through 1985.

Differences in Mission Bay employment explain most of the difference between the employment scenarios for the Downtown & Vicinity for each Alternative; employment in Mission Bay by 2000 would vary from a high of 9,930 under Alternative A to 7,110 under Alternative N to a low of 5,170 under Alternative B. The employment forecasts for the Downtown & Vicinity excluding Mission Bay would be very similar for the three Alternatives, ranging from about 434,300 to 434,700 in 2000 (see Table VI.B.18). The only difference between the scenarios for each Alternative would be in the hotel business activity./39/

Employment Forecasts by Business Activity. Tables VI.B.17 and VI.B.18 show employment forecasts for different business activities in the Downtown & Vicinity. (Table VI.B.17 includes Mission Bay employment while Table VI.B.18 does not.) Table VI.B.18 presents

TABLE VI.B.17: EMPLOYMENT SCENARIOS FOR THE DOWNTOWN & VICINITY, BY BUSINESS ACTIVITY, 1985 AND 2000

		Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
Business Activity	1985	2000	1986-2000	2000	1986-2000	2000	1986-2000
Office	249,840	339,700	+89,860	338,200	+88,360	338,200	+88,360
Retail	29,200	35,190	+5,990	35,170	+5,970	35,230	+6,030
Hotel	12,240	17,830	+5,590	17,830	+5,590	17,830	+5,590
Sales/Showroom	4,550	6,600	+2,050	6,600	+2,050	6,600	+2,050
Cultural/Institutional/ Educational	10,970	12,490	+1,520	12,490	+1,520	12,490	+1,520
S/LI/RD and M-2 Industrial/a/	0	2,840	+2,840	0	0	1,300	+1,300
Services/b/	14,980	15,360	+380	15,370	+390	15,780	+800
Distribution and Manufacturing	12,060	8,220	-3,840	8,360	-3,700	8,700	-3,360
Construction	7,890	6,050	-1,840	5,870	-2,020	5,700	-2,190
TOTAL	341,730	444,280	+102,550	439,890	+98,160	441,830	+100,100

NOTE: The numbers above include employment in Mission Bay and the other subareas of the Downtown & Vicinity. Employment for the Downtown & Vicinity excluding Mission Bay is presented in the next table. Table V.6, p. V.35, presents more detail for Mission Bay employment by use by Alternative. Comments regarding grouping uses in Mission Bay to correspond with business activity categories for the Downtown & Vicinity are included in Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.41-XIV.B.43. Appendix B also describes the forecasting methodology (see pp. XIV.B.17-XIV.B.36).

/a/ As described in Chapter V. The EIR Alternatives and Approval Process, p. V.2, S/LI/RD space in Mission Bay could accommodate a variety of different business activities including services, sales/showrooms, and light manufacturing; thus it is a separate category in the table. Similarly, a variety of those uses could be accommodated in new space built in Mission Bay under the M-2 zoning of Alternative N.

/b/ Includes building maintenance and security employment located in downtown buildings.

SOURCE: Recht Hausrath & Associates

TABLE VI.B.18: EMPLOYMENT SCENARIOS FOR THE DOWNTOWN & VICINITY EXCLUDING MISSION BAY, BY BUSINESS ACTIVITY, 1985 AND 2000

		Scenario for Alternative A		Scenario for Alternatives B & N		
Business Activity	1985	2000	1986-2000	2000	1986-2000	Annual Rate of Change/a/
Office	249,740	334,700	+84,960	334,700	+84,960	+1.97%
Retail	28,910	34,790	+5,880	34,790	+5,880	+1.24%
Hotel	12,240	17,460	+5,220	17,830	+5,590	+2.40%/2.54% (A) (B&N)
Sales/Showroom	4,550	6,600	+2,050	6,600	+2,050	+2.52%
Cultural/Institutional/ Educational	10,970	12,490	+1,520	12,490	+1,520	+0.87%
Services/b/	13,950	14,680	+730	14,680	+730	+0.34%
Distribution and Manufacturing	11,480	8,060	-3,420	8,060	-3,420	-2.33%
Construction	7,890	5,570	-2,320	5,570	-2,320	-2.29%
TOTAL	339,730	434,350	+94,620	434,720	+94,990	+1.65%

NOTE: The numbers above include employment in all subareas of the Downtown & Vicinity except Mission Bay. Employment for the total Downtown & Vicinity is presented in the preceding table. Table V.6, p.V.35, presents more detail for Mission Bay employment by Alternative in 2000. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.17-XIV.B.36, describes the forecasting methodology and assumptions.

/a/ Annual compound rate of change (growth or decline).
/b/ Includes building maintenance and security employment in downtown buildings.

SOURCE: Recht Hausrath & Associates

annual growth rates for the different sectors. The greatest opportunities for economic growth are in the office, tourism and retail/entertainment sectors. The reasoning behind the forecasts is summarized below.

- The greatest growth potential for office activity lies in business and professional services. San Francisco will remain a regional legal and business service center supporting federal, state and local court systems located in the City, corporate and other business activities in the City and throughout Northern California, and the international market within the Pacific Basin.

- San Francisco also is forecast to remain a financial center and a center for import/export companies, manufacturer's sales representatives, wholesalers, and other activity related to trade and product marketing/ distribution. Those economic activities will be an important source of office growth in the future.

- Executive and managerial office functions of large finance, insurance, manufacturing, mining, and similar companies will grow and will continue to prefer central locations in the City.

- The future outlook for back-office activity in San Francisco is mixed. Large shifts of employment out of San Francisco are not expected in the future. Generally, however, growth of that part of the office sector will be slower than in the past. Some growth of back-office activities is expected in the Downtown & Vicinity. Given the cost-consciousness and special needs for larger floor areas of some in that group, demand for back-office space will focus on peripheral locations in that area.

- Government office activities are unlikely to grow significantly in the Downtown & Vicinity. There will be shifts in the locations of government employment as agencies seek to reduce their space costs by locating in peripheral locations such as south of Market Street or in the Civic Center / South Van Ness area.

- Retail growth in the Downtown & Vicinity will be supported by spending of tourists and conventioneers, workers, residents of the area, and other residents of the City and region. Growth is forecast in specialty retailing, restaurants, entertainment, and convenience retail supported by residents and workers.

- Tourism and conventions offer important growth opportunities for the Downtown & Vicinity. Tourism supports growth of overnight accommodations, restaurant and retail establishments, entertainment, the arts, and other recreation-related activities.

- Sales/showroom activities in Showplace Square will continue to serve as San Francisco's center for sales to the trade in furniture, home furnishings, interior design, and gifts.

- Relatively small growth is expected for cultural, institutional, and educational activities.

- Services include a mix of activities with different trends for the future. Services supporting other businesses in the Downtown & Vicinity will remain in the area with some growth expected. Other service activities such as repair and rental services that do not serve downtown customers primarily will find lower-cost locations outside of the Downtown & Vicinity.

- Distribution activities in the Downtown & Vicinity include large-space users who located in the South of Market area many years ago. The ongoing pattern of decline in those activities in the area is expected to continue. For smaller sales and distribution activities providing products to a downtown market, outlying parts of the Downtown & Vicinity will continue to provide convenient and cost-effective locations.

- Employment in manufacturing activities in the Downtown & Vicinity is expected to continue to decline over time. The remaining representatives of producers who located south of Market many years ago will continue to leave the area. Other more specialized operations and those placing value on proximity to other activities in the Downtown & Vicinity are expected to remain in the area and to grow in some cases.

- Construction activity in the Downtown & Vicinity will continue to support a large number of person-years of construction labor. On an average annual basis, however, construction employment is expected to decline in the future primarily because the amount of office building development will decline from recent levels.

Employment for Subareas of the Downtown & Vicinity. Table VI.B.19 presents a scenario of employment for subareas of the Downtown & Vicinity. (Figure IV.1, p. IV.5, shows the boundaries of those subareas.) The largest amount of employment is expected to continue to be in the C-3 District. South of Market will have the next largest amount of employment, followed by Civic Center / South Van Ness, Northeast Waterfront, and Mission Bay in that order.

Over time, the C-3 District's percentage of total employment in the Downtown & Vicinity will decline. The South of Market and Mission Bay percentages will increase as more business activity and development shifts south of Market Street. The share of employment in the Northeast Waterfront is expected to remain fairly stable through 2000. Although some job growth is expected in the Civic Center / South Van Ness subarea, its share of total employment in the Downtown & Vicinity is forecast to decline.

Through the year 2000, Mission Bay would represent a small share of total business activity and employment in the Downtown & Vicinity (from 1% to 2% depending on the Alternative). Development of Mission Bay would account for 3% to 8% of employment growth in the Downtown & Vicinity from 1986 through 2000 (depending on the Alternative).

Outside of Mission Bay, the only difference in employment between the scenarios for each Alternative would occur in the C-3 District and would reflect a small difference in hotel business activity (see Table VI.B.19).

TABLE VI.B.19: EMPLOYMENT SCENARIOS FOR THE DOWNTOWN & VICINITY, BY SUBAREA, 1985 AND 2000/a/

		Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
Subarea	1985	2000	1986-2000	2000	1986-2000	2000	1986-2000
C-3 District	261,980	331,160	+69,180	331,530	+69,550	331,530	+69,550
South of Market	28,280	44,330	+16,050	44,330	+16,050	44,330	+16,050
Northeast Waterfront	22,020	28,460	+6,440	28,460	+6,440	28,460	+6,440
Civic Center/South Van Ness	27,450	30,400	+2,950	30,400	+2,950	30,400	+2,950
Subtotal	339,730	434,350	+94,620	434,720	+94,990	434,720	+94,990
Mission Bay/b/	2,000	9,930	+7,930	5,170	+3,170	7,110	+5,110
TOTAL DOWNTOWN & VICINITY	341,730	444,280	+102,550	439,890	+98,160	441,830	+100,100
Mission Bay as a Percent of Total Downtown & Vicinity	1%	2%	8%	1%	3%	2%	5%

NOTE: The estimates of employment for subareas shown in the table are approximate and provide a reasonable scenario based on current zoning, land supply, location preferences of space users, and real estate market factors. Also see Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.18-XIV.B.24, for more discussion of the assumptions for the forecasts.

/a/ The boundaries of these subareas are shown in Figure IV.1, p. IV.5.
/b/ Employment growth in Mission Bay is discussed in Chapter V. The EIR Alternatives and Approval Process, p. V.28-V.36. The 2000 employment estimates for the Mission Bay Alternatives above are those presented in Table V.6, p. V.35.

SOURCE: Recht Hausrath & Associates

The scenario for the Downtown & Vicinity, excluding Mission Bay, and the estimates for subareas assume that land use policies and zoning in effect during the winter of 1986 (when the forecasts were prepared) continue to apply in the future./40/ In the South of Market area, the South of Market Plan proposal in effect in the form of interim controls during 1987 is assumed. Given uncertainties in preparing smaller area forecasts, the distribution of future employment among subareas discussed above should be viewed as approximate. The estimates in Table VI.B.19 provide a reasonable scenario for EIR analysis considering current zoning, land supply, location preferences of space users, and real estate market factors.

Comparison to Forecasts in the Downtown Plan EIR. The employment forecasts presented above for the C-3 District can be compared directly with those for the C-3 District under the Downtown Plan presented in the Downtown Plan EIR. C-3 District forecasts in this Mission Bay EIR are an updated version of those in the Downtown Plan EIR using the same approach and methodology for the same geographic area. Comparison of numbers for 2000 indicates that C-3 District employment forecasts in the Mission Bay EIR (331,160 - 331,530, depending on the Alternative) are lower than that in the Downtown Plan EIR (376,420 under the Downtown Plan). The difference in employment is about 45,000 in 2000, indicating that the updated Mission Bay EIR forecasts have about 12% fewer jobs in the C-3 District in 2000 than did the Downtown Plan EIR forecast.

The differences between Mission Bay EIR and Downtown Plan EIR forecasts are in the office sector. As described in VI.B. Land Use, Business Activity and Employment, pp. VI.B.23-VI.B.25, and in Appendix B. Land Use, Business Activity, and Employment, pp. XIV.B.9-XIV.B.12, office employment declined from 1981 through 1985. Analysis of the amount of decline and the types of factors involved indicated that the Downtown Plan EIR forecasts should be updated for the Mission Bay EIR to reflect recent office market conditions and an updated outlook for the future. In addition to changes in economic factors, the forecasts were updated to reflect changes in land use policies since the original C-3 District forecasts were prepared (such as mid-Market Street rezoning, South of Market rezoning in areas formerly zoned C-3 and Proposition M limits on development). Appendix B. Land Use, Business Activity, and Employment, pp. XIV.B.24-XIV.B.26, provides a more detailed comparison of the Mission Bay EIR and Downtown Plan EIR forecasts and more explanation of the differences between them.

The Downtown Plan EIR did not present comparable forecasts for the other subareas of the Downtown & Vicinity; it provided a general description of growth potentials. Those also were reevaluated in light of recent conditions and also revised downward, reflecting slower economic growth than originally had been anticipated. Changes in the economy necessitated the update as did changes in land use policies, particularly the proposed South of Market rezoning and Proposition M.

Space by Use in the Downtown & Vicinity. Changes in building space associated with changes in employment in the Downtown & Vicinity are shown in Table VI.B.20. The changes reflect addition of space as a result of new construction as well as changes in use of existing space, including the occupancy of space that was vacant in 1985. As a result of employment growth, occupied space in the Downtown & Vicinity would increase by about 27 to 29 million square feet from 1986 through 2000 depending on the Alternative. (In other words, forecast employment growth would result in absorption of about 27 to 29 million square feet of space./37/) Office space would account for the largest increase in space, by far/41/; retail and hotel space also would increase. In combination, the amount of space occupied by all other uses would decline. However, within that group, increases in space are expected for showrooms, some services and S/LI/RD uses, while the amounts of space occupied by manufacturing, warehouse, distribution, and other service uses are expected to decline./42/

The total net addition of space from 1986 through 2000 would range from about 21 to 23 million square feet if a 5% vacancy existed for office space in 2000 (see Table VI.B.20)./43/ A decline in vacancy from 1985 levels as well as declines in the amounts of space occupied by some uses (older distribution, manufacturing and service uses) explain the fact that the increase in total space is less than the increase in occupied space.

Table VI.B.21, p. VI.B.62, identifies space by use for the Downtown & Vicinity excluding Mission Bay. The patterns described above continue to apply although the amounts of space are smaller when space in Mission Bay is excluded. For the Downtown & Vicinity excluding Mission Bay, occupied space is forecast to increase by about 27 million square feet from 1986 through 2000. Total space is expected to increase by about 21 million square feet. As would be the case for employment, there would be only a small difference between the scenarios for each Alternative in 2000.

TABLE VI.B.20: SPACE IN THE DOWNTOWN & VICINITY, BY USE, 1985 AND 2000 (Thousands of Gross Square Feet)

Use	1985	Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
		2000	1986-2000	2000	1986-2000	2000	1986-2000
Occupied Space							
Office/a/	68,963	94,884	+25,921 /b/	94,459	+25,496 /b/	94,459	+25,496 /b/
Retail	10,259	12,351	+2,092	12,341	+2,082	12,366	+2,107
Hotel	10,732	14,571	+3,839 /c/	14,571	+3,839 /c/	14,571	+3,839 /c/
Other Space/d/	35,443	32,502	-2,941	31,464	-3,979	32,661	-2,782
Subtotal	125,397	154,308	+28,911	152,835	+27,438	154,057	+28,660
Vacant Space/e/	17,266	11,233	-6,033	11,152	-6,114	11,179	-6,087
TOTAL SPACE	142,663	165,541	+22,878	163,987	+21,324	165,236	+22,573

NOTE: The estimates above include Mission Bay and other subareas of the Downtown & Vicinity. Table V.5, p. V.34, presents more detail for Mission Bay space by use by Alternative. The estimates are for building space categorized according to types of businesses occupying the space. They exclude the small amount of land area, exclusive of buildings, that is used by businesses. The estimates include space that is occupied or available for occupancy; space under construction is not included. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.32-XIV.B.34 and pp. XIV.B.37-XIV.B.41, provides background on the space estimates for 2000 and identifies how the 1986-2000 increases in office space compare to the annual limit on office development approvals under Proposition M.

/a/ "Office space" includes space occupied by office uses. Other uses (such as retail) in office buildings are categorized separately. Space occupied by government office activities is included in the office category. Older industrial or warehouse space converted to office use is categorized as office space.

/b/ The 1986-2000 change in occupied office space does not represent solely new construction of office space. The amount of new construction is less since a sizable share of the change in occupied office space consists of absorption of office space that was vacant in 1985. See note /41/.

/c/ The 1986-2000 hotel forecast represents an addition of about 6,200 hotel rooms in the Downtown & Vicinity. The hotel employment forecast also incorporates additional employment in existing hotels as facilities are upgraded. Upgrading is not represented by an increase in hotel space/rooms.

/d/ The "other space" category includes manufacturing, warehouse, services, distribution, showroom, institutional, parking, and S/LI/RD uses. The numbers for "other space" are the net result of changes in space use for all of those activities.

/e/ Most "vacant space" in 1985 was office space. Vacant space includes more than space that is vacant and available for lease. For 1985, the estimate includes office space vacated due to move-outs or business consolidations that was not on the market and may be temporarily occupied at lower-than average employment densities, but which could accommodate employment growth. "Vacant space" also includes other unoccupied warehouse or industrial space which could be converted to another use or demolished for a new construction site. The forecast assumes that much of the vacant space is absorbed, primarily due to office employment growth, over the 1986-2000 period. The estimate of vacant space in 2000 incorporates a 5% vacancy for total office space and a small amount of additional space (vacated due to declines in other uses) that has not yet been put to a new use.

SOURCE: Recht Hausrath & Associates.

TABLE VI.B.21: SPACE IN THE DOWNTOWN & VICINITY EXCLUDING MISSION BAY, BY USE, 1985 AND 2000 (Thousands of Gross Square Feet)

		Scenario for Alternative A		Scenario for Alternatives B & N	
Use	1985	2000	1986-2000	2000	1986-2000
Occupied Space					
Office/a/	68,931	93,509	+24,578 /b/	93,509	+24,578 /b/
Retail	10,208	12,256	+2,048	12,256	+2,048
Hotel	10,732	14,171	+3,439 /c/	14,571	+3,839
Other Space/d/	34,004	30,784	-3,220	30,784	-3,220
Subtotal	123,875	150,720	+26,845	151,120	+27,245
Vacant Space/e/	17,253	11,102	-6,151	11,102	-6,151
TOTAL SPACE	141,128	161,822	+20,694	162,222	+21,094

NOTE: The estimates above are of building space categorized according to types of businesses occupying the space. They include space that is occupied or available for occupancy; space under construction is not included. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.32-XIV.B.34, and pp. XIV.B.37-XIV.B.41, provides background on the space estimates for 2000 and identifies how the 1986-2000 increase in office space compares to the annual limit on office development approvals under Proposition M.

/a/ "Office space" includes space occupied by office uses. Other uses (such as retail) in office buildings are categorized separately. Space occupied by government office activities is included in the office category. Older industrial or warehouse space converted to office use is categorized as office space.

/b/ The 1986-2000 change in occupied office space does not represent solely new construction of office space. The amount of new construction is less since a sizable share of the change in occupied office space consists of absorption of office space that was vacant in 1985. See note /41/.

/c/ The 1986-2000 hotel forecast for the Downtown & Vicinity excluding Mission Bay represents an addition of about 5,700 hotel rooms under Alternative A and an addition of about 6,200 hotel rooms under Alternatives B and N. In Alternative A, a 500-room hotel (approximately 400,000 gross square feet) is assumed to be built in Mission Bay rather than elsewhere in the Downtown & Vicnity, so the forecast for hotel rooms in the Downtown & Vicinity including Mission Bay is the same for all Alternatives (see Table VI.B.20, p. VI.B.61). The hotel employment forecast also incorporates additional employment in existing hotels as facilities are upgraded. Upgrading is not represented by an increase in hotel space/rooms.

/d/ The "other space" category includes manufacturing, warehouse, services, distribution, showroom, institutional, and parking uses. The numbers for "other space" are the net result of changes in space use for all of those activities.

/e/ Most "vacant space" in 1985 was office space. Vacant space includes more than space that is vacant and available for lease. For 1985, the estimate includes office space vacated due to move-outs or business consolidations that was not on the market and may be temporarily occupied at lower-than-average employment densities, but which could accommodate employment growth. "Vacant space" also includes other unoccupied warehouse or industrial space which could be converted to another use or demolished for a new construction site. The forecast assumes that much of the vacant space is absorbed, primarily due to office employment growth, over the 1986-2000 period. The estimate of vacant space in 2000 incorporates a 5% vacancy for total office space and a small amount of additional space (vacated due to declines in other uses) that has not yet been put to a new use.

SOURCE: Recht Hausrath & Associates

Relationship of Office Forecasts to Proposition M Limit on Office Development Approvals. For the purposes of the Mission Bay EIR, it is assumed that the Proposition M annual limit on citywide office development approvals would not constrain the amount or pace of office development in the Project Area. That would be contingent on voters exempting Mission Bay from the annual limit as allowed for in the law. That assumption for Mission Bay allows the EIR analysis to be based on timely development of the Project Area Alternatives.

For the Downtown & Vicinity excluding Mission Bay, office growth will be accommodated first in space vacant in 1985 (when vacancies were higher than average) and in space added in projects approved prior to Proposition M. Subsequently, space would be absorbed in office projects approved under the annual limit established by Proposition M. Regarding the amount of office space to be approved under the annual limit, there are uncertainties as to whether there would be additional exemptions from the limit and how approvals would be allocated within the City (since the ordinance applies citywide). The approach is conservative for purposes of environmental impact analysis by assuming Proposition M limits with some additional exemptions besides Mission Bay. It also assumes that office space in the Downtown & Vicinity would represent the large majority of all space approved in the City. Further, the forecasts recognize that the market would adapt to accommodate employment growth in existing space (higher employment densities) when the supply of office space becomes low relative to demand. Appendix B. Land Use, Business Activity, and Employment, pp. XIV.B.37-XIV.B.41, provides a more detailed description of how the space forecasts relate to the Proposition M annual limit.

Citywide Employment

Overview. In addition to growth in the Downtown & Vicinity, employment growth is expected in the rest of the City as well. In total, citywide employment forecasts show employment in 2000 ranging from 719,000 to 722,000 depending on the Alternative (see Table VI.B.22). The forecasts represent employment growth of from 134,000 to 137,000 at an annual rate of about 1.4% from 1986 through 2000. That is a slower rate of growth than has occurred since 1972 (see pp. VI.B.22-VI.B.23 and Table XIV.B.6, p. XIV.B.10), reflecting a maturing of the economy, changing conditions in some sectors, and recognition of slower growth of the labor force in future years.

TABLE VI.B.22: SAN FRANCISCO EMPLOYMENT, 1985 AND 2000

		Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
	1985	2000	1986-2000	2000	1986-2000	2000	1986-2000
Downtown & Vicinity	341,730	444,280	+102,550	439,890	+98,160	441,830	+100,100
Downtown & Vicinity Excluding Mission Bay	339,730	434,350	+94,620	434,720	+94,990	434,720	+94,990
Mission Bay	2,000	9,930	+7,930	5,170	+3,170	7,110	+5,110
Rest of City	243,170	277,310	+34,140	279,420	+36,250	279,220	+36,050
TOTAL CITY	584,900	721,590	+136,690	719,310	+134,410	721,050	+136,150
Annual Growth Rate/a/			+1.41%		+1.39%		+1.40%

NOTE: The citywide scenarios provide employment estimates for cumulative analyses in the Mission Bay EIR. Background on the forecasts and methodology are provided in Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.17-XIV.B.36.

/a/ Annual compound growth rates.

SOURCE: Recht Hausrath & Associates

San Francisco is expected to remain primarily a service-based economy in the years ahead. The City's economic strengths will be derived from:

- Its location at the focal point of the fourth largest economic region in the United States;
- Its role as a center for headquarters and specialized business and professional services;
- Its role as an international business center within the growing Pacific Rim;
- Its visual beauty and reputation as a desirable destination for national and international tourism and convention activity;
- Its role in providing retail, entertainment and cultural experiences for a growing Bay Area population;
- Its reputation for attracting talented individuals with creative interests and entrepreneurial skills; and
- Its location within a region with several major educational institutions with superb academic reputations.

The area designated as the Downtown & Vicinity is expected to continue to account for the largest share of citywide employment, about 60%, experiencing a small increase in its percentage of the total over time.

Employment and Business Activity in the Rest of the City Outside the Downtown & Vicinity. The growth of employment in the rest of the City will depend on growth in retail trade, neighborhood services, and education, medical and health care services located throughout the City. Government activities (public transportation, road maintenance, postal service, the military and associated civilian operations), hotels/motels and other overnight accommodations, and various professional and other specialized services also are expected to grow in the rest of the City. Industrial activities are forecast to continue to decline in San Francisco. However, the rate of decline will be slower than in the past. Many of the City's industrial and service businesses are located in the southeastern parts of the City to the west and south of the Project Area. Since many are in nearby areas examined in the impact assessment, a summary of the forecast for those activities and areas is presented below.

Nearby Industrial Areas. There is some potential for strengthening the City's industrial/manufacturing base in the southeastern parts of the City. Those potentials focus on specialized manufacturing activities, often small operations. Examples of those activities include: printing, photography and related activities, creative arts workshops, film and video production, apparel design and manufacturing, custom furnishings manufacturing, and food production. The older, larger-scale, more traditional manufacturing operations, however, are forecast to continue to decline. Those include: metal products manufacturing, maritime and other industrial equipment manufacturing, some food and beverage production, and construction materials processing. Many are in outmoded facilities or at locations that are no longer the most cost effective. Employment declines in those activities will offset increases in other types of activities. The net effect is expected to be some decline in manufacturing employment.

Similarly, some types of wholesale and distribution activities in the southeastern parts of the City are expected to increase and others are forecast to decline. Some overall decline is expected to be the net result. Wholesale and distribution activities that are expected to grow include those related to interior decorating and furnishings, those serving the downtown market (office machines, paper products, etc.), and those serving the retail and food service industries throughout the City. The ongoing pattern of decline is expected to continue for larger-space-using distribution facilities which formerly chose San Francisco locations because they offered the advantages of convenient access to major market areas served. There are now lower-cost, more convenient locations elsewhere.

Service activities are expected to show some increase in the rest of the City. Examples of the types of activities included in that group are: communications and delivery services, services to buildings, construction services, rental services, and auto and other repair services, many of which serve the office and hotel sectors as well as residents and other businesses throughout the City. Larger transportation and freight and warehousing services are expected to decline for the reasons discussed above for distribution activities.

Over time, changes described above in the older industrial areas of the City will become more evident first in those areas nearer the Downtown & Vicinity, particularly in the areas adjacent to the Project Area. As downtown-type activities grow in southerly locations, other uses move further south in search of less congestion and low rents. As interest increases in those areas, some of the uses there look to locations still further south.

Maritime Activities. In the future, maritime activity in San Francisco is expected to become more concentrated in the southern waterfront in the vicinity of the Port's facilities and operations at Piers 70, 80 and 94 to 96. Growth and expansion of downtown-type activities and associated effects (changing character of waterfront areas, increasing land values along the waterfront, and congestion) will discourage maritime operations and maritime-related businesses from locations to the north. For maritime-related activity, sites to the south will be more convenient to San Francisco's major shipping terminals and will offer lower-cost space and more suitable land use conditions.

Given that outlook, maritime-related activity in the Project Area east of Third Street is assumed for this EIR to decline slowly over time. The future for maritime activities on the piers adjacent to the Project Area is uncertain. Potential exists for continuation of specialized bulk cargo handling (e.g., newsprint) and ship repair over the 1986-2000 forecast period. For the forecasts in this EIR, activity on those piers is assumed to remain at about 1985 levels.

Employment Differences Between the Scenarios for Each Alternative. The trends described above apply to areas outside the Project Area for all Mission Bay Alternatives. The numbers representing the forecasts for 2000, however, show some small differences between the scenarios for each Alternative in citywide employment and employment in the Downtown & Vicinity and the rest of the City outside Mission Bay (see Table VI.B.22, p. VI.B.64). Those differences illustrate how the location of development and business activity would vary depending on the land uses accommodated in Mission Bay under the different Project Area Alternatives. The reasons for the differences are the same as those for the build-out/2020 time period, when the differences are larger than for the 2000 interim analysis (see p. VI.B.76 for discussion). The different effects of the Mission Bay Alternatives themselves on employment and development patterns in San Francisco are described in the impact section (see p. VI.B.119).

Comparison to Other Forecasts. Forecasts for future employment in San Francisco through 2000 have been prepared by a number of agencies and institutions. The forecasts were done for various purposes and involved differing types of analyses and levels of specificity about San Francisco's economy. Those forecasts were reviewed as part of the background analysis for the Mission Bay EIR. They can be compared generally to the forecast for the Mission Bay EIR in terms of the outlook for the future that each provides. (See Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.27-XIV.B.28, for a comparison of all these forecasts.) Forecasts by the

Association of Bay Area Governments (ABAG), Wells Fargo Bank and Institute for the Future show lower rates of growth than this EIR forecast. The annual rates of growth of the three lower forecasts range from 1.06% to 1.16%, compared to the 1.4% rate for the citywide forecast in the Mission Bay EIR.

The U.S. Department of Commerce, Bureau of Economic Analysis' employment forecast for San Francisco, San Mateo and Marin Counties shows a higher annual rate of growth (1.5%) than the EIR forecast. Since San Francisco is likely to have a lower growth rate than the other two counties, the rate of growth for the City's employment in that forecast may be similar to that for the Mission Bay EIR forecast.

Forecasts prepared by Pacific Gas and Electric Co. (PG&E) and by the National Planning Association expect higher rates of employment growth in San Francisco than anticipated in the forecast done for the Mission Bay EIR. Those two higher forecasts reflect annual growth rates of 1.53% and 1.71%, respectively.

The economic analysis and forecasting for this EIR included a more in-depth look at the different sectors and subsectors of San Francisco's economy than did the analyses done for most of the other forecasts. It is the only analysis that focuses on the Downtown & Vicinity and the Mission Bay Alternatives as opposed to the total City. The in-depth analysis and forecasts were done for this EIR (instead of using one of the other forecasts mentioned above) because scenarios were required that would incorporate the different Mission Bay Alternatives (the subject of the EIR) and be sensitive to the differences between the Alternatives. It also was important for the impact analyses to have forecasts that focused on economic activity and development patterns in the Downtown & Vicinity as well as on the relationship between Mission Bay development and growth in other parts of the Downtown & Vicinity and nearby industrial areas.

Regional Context

Employment forecasts prepared by the Association of Bay Area Governments (ABAG) provide a future context for the rest of the Bay Area region in 2000. As shown in Table VI.B.23, employment in the rest of the region is expected to total about three million jobs in 2000. That would reflect growth of about 800,000 jobs from 1986 to 2000, at an annual rate of just over 2%. According to the ABAG forecasts, economic growth in the region will continue to focus on high technology and related activities, research and development, office and information services, business services, finance, insurance, and real estate, and retail trade.

Outside San Francisco, larger amounts of job growth are expected in the East Bay and South Bay with relatively less growth in the North Bay. In terms of rates of growth, North Bay counties are expected to experience the highest rate of change in employment, followed by the East Bay and then the South Bay.

When San Francisco is included, job growth in the total Bay Area is about 940,000, bringing regional employment to a total of just over 3.7 million in 2000./44/

Within the regional context, employment in San Francisco is forecast to decline over time as a share of total Bay Area employment. San Francisco employment currently represents about 21% of the region's employment; by 2000, that percentage is expected to be about 19%. The increase in employment in San Francisco would represent about 14% to 15% of regional employment growth from 1986 through 2000.

Different regional scenarios have not been prepared for each of the Mission Bay Alternatives. While some differences could occur, they would be very small relative to the large totals for employment and employment growth in the rest of the region. Such differences are discussed in the impact section of this chapter from the perspective of the effects of the Mission Bay Alternatives on regional development patterns and employment (see p. VI.B.119).

Build-Out/2020

The 2020 scenarios represent order-of-magnitude estimates for describing longer-term potentials for growth that could occur over the build-out period for Mission Bay. The forecasts are based on long-term economic and labor force trends.

The rate of employment growth is expected to slow significantly through the build-out/2020 time period. The trend applies for the nation, state and region as well as for San Francisco. It reflects a maturing of the economy and a further slowing of labor force growth.

TABLE VI.B.23: EMPLOYMENT IN THE REST OF THE REGION, 1985 AND 2000

	Employment			
Bay Area Counties	1985/a/	2000/b/	1986–2000	Annual Growth Rate/c/
East Bay	916,400	1,260,500	+344,100	+2.15%
Alameda	550,200	724,200		
Contra Costa	247,400	342,800		
Napa	37,400	54,100		
Solano	81,400	139,400		
South Bay	1,079,400	1,453,700	+374,300	+2.00%
San Mateo	282,800	341,800		
Santa Clara	796,600	1,111,900		
North Bay	209,600	295,700	+86,100	+2.32%
Marin	89,400	121,000		
Sonoma	120,200	174,700		
TOTAL REST OF REGION EXCLUDING SAN FRANCISCO	2,205,400	3,009,900	+804,500	+2.09%

/a/ The 1985 employment estimates shown here are those reported by the California Employment Development Department (EDD) in the May 1986 Annual Planning Information documents for each county. They are the estimates used throughout the EIR (see Table VI.B.11, p. VI.B.21).
/b/ Association of Bay Area Governments, Projections '85.
/c/ Annual compound growth rates.

SOURCE: Recht Hausrath & Associates

Downtown & Vicinity

At build-out/2020, total employment in the Downtown & Vicinity including Mission Bay would range from about 489,000 to 504,000 depending on the Alternative (see Table VI.B.24). Growth of employment in the Downtown & Vicinity in the 20 years following 2000 would range from about 49,000 to 60,000. Those scenarios represent annual rates of employment growth ranging from 0.5% to 0.6%, depending on the

TABLE VI.B.24: EMPLOYMENT SCENARIOS FOR THE DOWNTOWN & VICINITY, BY BUSINESS ACTIVITY, 1985, 2000 AND BUILD-OUT/2020

		Scenario for Alternative A			Scenario for Alternative B			Scenario for Alternative N		
Business Activity	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
Office	249,840	339,700	388,200	+48,500	338,200	381,200	+43,000	338,200	381,200	+43,000
Retail	29,200	35,190	39,400	+4,210	35,170	39,200	+4,030	35,230	39,000	+3,770
Hotel	12,240	17,830	20,500	+2,670	17,830	20,500	+2,670	17,830	20,500	+2,670
All Others/a/	50,450	51,560	55,900	+4,340	48,690	48,200	-490	50,570	58,900	+8,330
TOTAL	341,730	444,280	504,000	+59,720	439,890	489,100	+49,210	441,830	499,600	+57,770
Annual Growth Rate/b/				+0.63%			+0.53%			+0.62%

NOTE: The numbers above include employment in Mission Bay and the other subareas of the Downtown & Vicinity. Employment for the Downtown & Vicinity excluding Mission Bay is presented in the next table. Table V.6, p. V.35, presents more detail for Mission Bay employment by use by Alternative. Comments regarding grouping of uses in Mission Bay to correspond with the business activity categories used for the Downtown & Vicinity are included in Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.41-XIV.B.43. Appendix B also describes the forecasting methodology (see pp. XIV.B.17-XIV.B.36).

/a/ "All others" includes the following business activities: sales/showrooms, cultural/institutional/educational, services including building maintenance/security, distribution and manufacturing, construction, and S/LI/RD, M-2 Industrial, and Port-Related/M-2 uses in the Mission Bay Project Area.

/b/ Annual compound growth rates.

SOURCE: Recht Hausrath & Associates

Alternative. The rates are less than half the rate of growth forecast for the prior 15 years (about 1.7% per year for all Alternatives), reflecting slower growth over the long term.

As a result of employment growth and the resultant absorption of building space, occupied space in the Downtown & Vicinity would increase by about 12 to 16 million square feet from 2001 through 2020, depending on the Alternative. The total net addition of space in the Downtown & Vicinity also would range from about 12 to 16 million square feet if a 5% vacancy existed for office space in 2020./45/

The employment scenarios for the Downtown & Vicinity excluding Mission Bay would be similar for the Alternatives, ranging from about 479,000 to 483,000 at build-out/2020 (see Table VI.B.25, p. VI.B.73). Employment growth would range from about 45,000 to 48,000. For the Downtown & Vicinity excluding Mission Bay, occupied and total space would increase by about 11 to 12 million square feet depending on the Alternative (see Table XIV.B.12, p. XIV.B.34). Differences between the scenarios for each Alternative in employment and occupied space in the Downtown & Vicinity excluding Mission Bay would reflect differences in the location of business activities, depending on demand accommodated in the Project Area.

The Proposition M annual limit on citywide office development approvals is assumed to continue in effect through build-out/2020. The limit will allow approval of 950,000 square feet of additional office space per year throughout most of the forecast period. Office space in Mission Bay is assumed to be exempt from the limit. Office growth expected to occur in the Downtown & Vicinity outside Mission Bay through build-out/2020 could be accommodated under the annual limit given those assumptions.

Over the long term, office, tourism and retail/entertainment activities will continue to provide most of the employment growth in the Downtown & Vicinity (see Tables VI.B.24 and VI.B. 25, pp. VI.B.71 and VI.E.73). The trends described for various business activities for the earlier forecast period generally will remain applicable over the long term (see p. VI.B.56). Within the category of "all others," older industrial activities (distribution, manufacturing, some services) will continue to decline while sales/showrooms, cultural/institutional/ educational, and some services and light industrial uses will continue to operate and will experience some growth.

TABLE VI.B.25: EMPLOYMENT SCENARIOS FOR THE DOWNTOWN & VICINITY EXCLUDING MISSION BAY, BY BUSINESS ACTIVITY, 1985, 2000 AND BUILD-OUT/2020

		Scenario for Alternative A			Scenario for Alternative B			Scenario for Alternative N		
Business Activity	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
Office	249,740	334,700	374,000	+39,300	334,700	377,700	+43,000	334,700	377,700	+43,000
Retail	28,910	34,790	38,400	+3,610	34,790	38,400	+3,610	34,790	38,500	+3,710
Hotel	12,240	17,460	20,100	+2,640	17,830	20,500	+2,670	17,830	20,500	+2,670
All Others/a/	48,840	47,400	46,500	-900	47,400	46,300	-1,100	47,400	45,700	-1,700
TOTAL	339,730	434,350	479,000	+44,650	434,720	482,900	+48,180	434,720	482,400	+47,680
Annual Growth Rate/b/				+0.49%			+0.53%			+0.52%

NOTE: The numbers above include employment in all subareas of the Downtown & Vicinity except Mission Bay. Employment for the total Downtown & Vicinity is presented in the preceding table. Table V.6, p. V.35, presents more detail for Mission Bay employment by Alternative. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.17-XIV.B.36, describes the forecasting methodology.

/a/ "All others" includes the following business activities: sales/showroom, cultural/institutional/educational, services including building maintenance/security, distribution and manufacturing, and construction.

/b/ Annual compound growth rates.

SOURCE: Recht Hausrath & Associates

The distribution of total employment in the Downtown & Vicinity among subareas by 2020 remains fairly similar to the distribution in 2000 described earlier (see Table VI.B.26). However, the long-term pattern of growth reflects some differences from the pattern for the earlier forecast period.

The largest amount of employment growth in the Downtown & Vicinity will continue to occur in the C-3 District while that subarea's share of growth will continue to decline. Growth will occur in the South of Market although the area's share of total growth also will decline over time as larger percentages of growth occur in the more outlying subareas (Mission Bay and the Civic Center / South Van Ness). The Northeast Waterfront will continue to capture employment growth; by 2020 that subarea will be largely built-out under current zoning. The Civic Center / South Van Ness subarea will increase its share of total employment growth in the Downtown & Vicinity over the long term when closer-in areas are developed more fully.

Employment growth in Mission Bay from 2001 through build-out would represent from 2% to 25% of employment growth in the Downtown & Vicinity during the forecast period. The large range reflects differences between the Alternatives in Project Area employment growth. Under Alternative B, most Project Area employment growth would have occurred by 2000, while under Alternatives A and N, most would occur after that time. The larger amounts of growth under Alternatives A and N would represent large percentages of total employment growth in the Downtown & Vicinity over the 2001-2020 forecast period. During that period, growth in Mission Bay would be larger than growth in other subareas except the C-3 District.

When the Project Area Alternatives are fully developed, Mission Bay would include from 1% to 5% of total employment in the Downtown & Vicinity, depending on the Alternative. Although Mission Bay would represent a relatively small share of the total, it would represent a larger share of the growth in the 20 years prior to build-out.

As described for the 2000 forecasts, the distribution of employment among subareas of the Downtown & Vicinity (excluding Mission Bay) is approximate and is provided to illustrate expected future trends. Comparison of the scenarios for the Alternatives provides an example of how Mission Bay would affect employment in other areas. Those effects are described in the succeeding impact section as impacts on Nearby Areas and on citywide employment and development patterns (see pp. VI.B.106 and VI.B.119).

TABLE VI.B.26: EMPLOYMENT SCENARIOS FOR THE DOWNTOWN & VICINITY, BY SUBAREA, 1985, 2000 AND BUILD-OUT/2020/a/

		Scenario for Alternative A			Scenario for Alternative B			Scenario for Alternative N		
Subarea	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
C-3 District	261,980	331,160	360,800	+29,640	331,530	362,200	+30,670	331,530	362,200	+30,670
South of Market	28,280	44,330	51,400	+7,070	44,330	52,900	+8,570	44,330	52,400	+8,070
Northeast Waterfront	22,020	28,460	32,800	+4,340	28,460	32,800	+4,340	28,460	32,800	+4,340
Civic Center / South Van Ness	27,450	30,400	34,000	+3,600	30,400	35,000	+4,600	30,400	35,000	+4,600
Subtotal	339,730	434,350	479,000	+44,650	434,720	482,900	+48,180	434,720	482,400	+47,680
Mission Bay/b/	2,000	9,930	25,000	+15,070	5,170	6,200	+1,030	7,110	17,200	+10,090
TOTAL DOWNTOWN & VICINITY	341,730	444,280	504,000	+59,720	439,890	489,100	+49,210	441,830	499,600	+57,770
Mission Bay as a Percent of Total Downtown & Vicinity	1%	2%	5%	25%	1%	1%	2%	2%	3%	17%

NOTE: The estimates of employment for subareas shown in the table are only approximate and provide one reasonable scenario based on current zoning, land supply, location preferences of space users, and real estate market factors. Other distributions are possible. Since the EIR analysis focuses on totals for the Downtown & Vicinity outside Mission Bay for purposes of assessing cumulative impacts, different distributions of growth within the overall area would not change the conclusions of the analysis. Also see Appendix B. Land Use, Business, Activity and Employment, pp. XIV.B.30-XIV.B.32.

/a/ The boundaries of these subareas are shown in Figure IV.1, p. IV.5.

/b/ Employment growth in Mission Bay is discussed in Chapter V. The EIR Alternatives and Approval Process, pp. V.28-V.38. The build-out/2020 employment estimates for the Mission Bay Alternatives are those presented in Table V.6, p. V.35.

SOURCE: Recht Hausrath & Associates

Citywide Employment

Scenarios of future citywide employment show totals in 2020 ranging from 785,000 to 795,000 depending on the Alternative (see Table VI.B.27). Those scenarios represent employment growth of from 66,000 to 73,000 at annual rates of 0.44% to 0.48% from 2001 through 2020. Those rates are less than half the rate of growth forecast for the prior 15 years (about 1.4% per year for all Alternatives), reflecting slower growth over the long term.

The description for 2000 of the City's future economy generally will apply over the long term as well (see p. VI.B.63). The Downtown & Vicinity will continue to account for the largest share of citywide employment; changes in future employment in the Downtown & Vicinity are described above. Employment growth in the rest of the City will continue to reflect growth of retail trade, neighborhood services, education, medical, and health care services, government activities, hotels/motels, and other professional and recreational services.

Employment in the rest of the City outside the area designated as Downtown & Vicinity also will reflect changes in the nearby industrial areas in the southeastern parts of the City. Trends described for the earlier forecast period will apply for the 2001 - build-out/2020 period (see p. VI.B.65). Many of the older industrial activities will have left the City or ceased operations by 2020. More of the area will be devoted to specialized manufacturing and to wholesale, distribution and service activities serving downtown markets and the hotel, retail and food service industries throughout the City. Maritime activities will be more concentrated in the southern waterfront in the vicinity of the Port's facilities at Piers 70, 80 and 94 to -96.

Compared to the earlier forecast period, more changes will have occurred in the southeastern areas nearer the Downtown & Vicinity, particularly in areas bordering Mission Bay. New land uses in the Project Area and in Nearby Areas, particularly in the North Potrero area to the west of Mission Bay, will have replaced older industrial activities and enhanced the desirability of those areas and of other areas to the south. New construction as well as rehabilitation will have occurred in those areas and the levels of activity and employment will have increased. Those types of changes are expected in the scenarios for each Mission Bay Alternative.

TABLE VI.B.27: SAN FRANCISCO EMPLOYMENT, 1985, 2000 AND BUILD-OUT/2020

		Scenario for Alternative A			Scenario for Alternative B			Scenario for Alternative N		
	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
Downtown & Vicinity	341,730	444,280	504,000	+59,720	439,890	489,100	+49,210	441,830	499,600	+57,770
Downtown & Vicinity Excluding Mission Bay	339,730	434,350	479,000	+44,650	434,720	482,900	+48,180	434,720	482,400	+47,680
Mission Bay	2,000	9,930	25,000	+15,070	5,170	6,200	+1,030	7,110	17,200	+10,090
Rest of City	243,170	277,310	290,800	+13,490	279,420	296,500	+17,080	279,220	291,900	+12,680
TOTAL CITY	584,900	721,590	794,800	+73,210	719,310	785,600	+66,290	721,050	791,500	+70,450
Annual Growth Rate/a/				+0.48%			+0.44%			+0.47%

NOTE: The citywide scenarios provide employment estimates for cumulative analyses in the Mission Bay EIR. Background on the forecasts and methodology are provided in Appendix B. Land Use, Business Activity, and Employment, pp. XIV.B.17-XIV.B.36.

/a/ Annual compound growth rates.

SOURCE: Recht Hausrath & Associates

However, there also would be differences between the scenarios for each Alternative in employment in Nearby Areas depending on types of land uses in the Project Area and the degree of change and upgrading that would occur in the Project Area. Those differences are described in the Impact section as effects on Nearby Areas (see p. VI.B.106).

There would be differences between the scenarios for each Alternative in total citywide employment (see Table VI.B.27, p. VI.B.77). Those differences reflect how the locations of development and business activity within the region would vary depending on whether an Alternative provides locations that enhance the City's ability to compete with the suburbs for back-office, research and development, and other light industrial uses. Mission Bay Alternatives that provide competitive locations result in more business activity and employment in San Francisco than Alternatives that do not.

Differences between the scenarios for each Alternative in citywide employment would be less than differences in Project Area employment, however. The reason is that Mission Bay also would provide locations that compete with other parts of the City for office, showroom, service, and light industrial uses. Thus, some of the demand accommodated in the Project Area would locate elsewhere in the City if not accommodated in Mission Bay. In that case, the location of business activity within the City would be affected rather than the total amount of employment in San Francisco. Effects on both citywide employment and the location of employment within the City are described later in the impact section as effects of the Mission Bay Alternatives on employment and development patterns in San Francisco (see p. VI.B.119).

Regional Context

Order-of-magnitude estimates of 2020 employment in the rest of the Bay Area region were prepared to provide a future regional scenario for cumulative analysis in the EIR. As shown in Table VI.B.28, employment in the rest of the region outside of San Francisco is estimated at about 3.4 million jobs at build-out/2020. That would reflect growth of about 400,000 jobs from 2001 through 2020, at an annual rate of about 0.6%. The scenario reflects a slowing of regional employment growth compared to the earlier analysis period (when growth is forecast at about 2.0% per year).

When San Francisco is included, employment growth in the total Bay Area would be about 460,000, bringing regional employment to a total of about 4.2 million in 2020. The resultant rate of growth for the total Bay Area region would be about 0.58%.

TABLE VI.B.28: EMPLOYMENT IN THE REST OF THE REGION, 1985, 2000, AND BUILD-OUT/2020

Area of Region	Employment 1985	Employment 2000/a/	Employment 2020/b/	2001-2020	Annual Growth Rate 2001-2020/c/
East Bay	916,400	1,260,500	1,425,000	+164,500	+0.61%
South Bay	1,079,400	1,453,700	1,631,000	+177,300	+0.58%
North Bay	209,600	295,700	344,000	+48,300	+0.76%
TOTAL REST OF REGION EXCLUDING SAN FRANCISCO	2,205,400	3,009,900	3,400,000	+390,100	+0.61%

/a/ Association of Bay Area Governments, Projections '85.
/b/ Order-of-magnitude estimates developed to provide a future context for cumulative analysis in the Mission Bay EIR.
/c/ Annual compound growth rates.

SOURCE: Recht Hausrath & Associates

Different regional scenarios have not been prepared for each of the Alternatives. While some differences would occur, they would be small relative to the large totals for employment and employment growth in the rest of the region. Also, it would be difficult and speculative to allocate differences to the various parts of the region. Such differences are described in the Impact section from the perspective of the effect of the Project Area Alternatives on regional development patterns (see p. VI.B.119).

IMPACT

This section describes the implications of the Mission Bay Alternatives for land use, business activity, employment, and job opportunities in the Project Area and Nearby Areas and identifies differences between the Alternatives in citywide and regional employment and development patterns. The section is organized by geographic area.

Implications for the Project Area are described first. That discussion follows from Chapter V. The EIR Alternatives and Approval Process, pp. V.1-V.19 and pp. V.28-V.38, and the description of existing land use and employment in the Project Area beginning on p. VI.B.1. Future business activity and employment in the Project Area depend on the overall land use programs of the Alternatives; each represents different amounts and types of commercial land use and, consequently, different amounts and types of employment. The implications of the different land use programs for jobs in the Project Area in the future are described. Development of Mission Bay also would have implications for existing businesses in the Project Area. The issue of business transition and displacement is discussed. The description of Project Area impacts concludes with discussion of maritime-related activity and retail activity.

The descriptions of implications for Nearby Areas and for citywide and regional employment growth and development patterns follow from the Future Context scenarios for land use, business activity and employment. That section described overall development patterns and amounts of growth expected in the Downtown & Vicinity, the total City and the rest of the region. The impact discussion uses that as background for comparison of effects of Mission Bay Alternatives. In Nearby Areas, the Project Area Alternatives have different implications for the pace of growth and change and, to some extent, the amount and type of business activity and employment in those areas in the future. From citywide and regional perspectives, the Project Area Alternatives not only result in different development patterns within the City (described as effects on Nearby Areas), but also result in different scenarios for employment growth in the City. Consequently, there are differences between the Alternatives in regional development patterns, depending on whether employment growth occurs in San Francisco (as a consequence of the development program for Mission Bay) or whether that growth occurs elsewhere in the region (because it is not accommodated by the development program for Mission Bay).

MISSION BAY PROJECT AREA

Comparison of the Land Use Characteristics of the Alternatives

Over time, the characteristics of the Mission Bay Project Area would change irrespective of master-planned development of the site. Existing land use conditions would not persist over the long term, just as Mission Bay and areas around it have changed throughout the course of San Francisco's development. The No Project Alternative (Alternative N) illustrates a likely scenario for future change in Mission Bay following existing zoning, Master Plan policies and the general trend of development and economic activity in that part of the City. In contrast to Alternative N, Alternatives A and B represent two different master plans for Mission Bay, both of which would change the characteristics of the Project Area beyond what would be expected to occur without coordinated public/private planning and development efforts.

The three Mission Bay Alternatives represent a wide range of possible futures for that part of the Downtown & Vicinity. In Alternative N, all of Mission Bay would remain in commercial/industrial use. In Alternative B, the majority of the Project Area would be devoted to residential and open space uses. In Alternative A, there would be a mix of commercial and residential uses, with considerable variety in types of non-residential use designations. The differences in land use characteristics affect the amount and type of business activity and employment in the Project Area as well as the function of Mission Bay as part of the Downtown & Vicinity and the rest of the City. (See Chapter V. The EIR Alternatives and Approval Process, pp. V.1–V.19, for description of the land use programs of the Alternatives.)

2000

None of the Alternatives would be fully developed in 2000 although the character of the Project Area would be changing under each. The overall change in land use characteristics represented by the Alternatives is described below, under the heading "Build-out/2020." In 2000, characteristics of the Project Area under the three Alternatives would not be as different as they would be eventually. By 2000, under Alternative N, land use conditions in the Project Area would remain more similar to existing conditions than they would under Alternatives A or B. Under those Alternatives, more change would be evident, although the character of the change would be different in each as a consequence of the different land use emphasis each represents.

The Project Area would evolve gradually in the direction of the land use program represented by each Alternative. In the course of that evolution, existing activity remaining in the Project Area would result in a greater mix of uses and activity in Mission Bay in interim years than would exist at build-out, particularly for Alternatives A and B. In interim years, there could be instances of new land uses (e.g., residential development) adjacent to existing businesses still operating in the Project Area. The potential for land use conflicts would decrease over the build-out period.

Build-Out/2020

Alternative A. Alternative A, a mixed-use master plan with about equal amounts of land devoted to commercial and residential uses, would consist of more total development at higher densities and more variety in future uses in the Project Area than would the other Alternatives. Although Alternative A would not have as many housing units as would Alternative B, residential development in Alternative A would represent a large addition of housing to the Downtown & Vicinity. Consistent with Mission Bay's peripheral location and master-planned development scheme, the character of commercial development in Alternative A would resemble that of newer suburban office developments more than it would that of the downtown office district. Nevertheless office, S/LI/RD, hotel, and retail development in Alternative A would be higher density, with more amenities, higher costs of space and higher levels of activity than new Project Area development in Alternative N. Under Alternative A, Mission Bay would become a distinctive urban neighborhood within the Downtown & Vicinity, with both employment and residential population.

Alternative B. Alternative B, devoted primarily to residential development, proposes the greatest change in function and character of Mission Bay. Under Alternative B, Mission Bay would become a residential enclave. Alternative B would be an extension of on-going efforts to expand the City's supply of housing. Recently, most of those efforts have focused on new housing development in Downtown & Vicinity, particularly South of Market. The large amount of residential development and open space in Alternative B would reinforce that trend.

Alternative N. The key determinant of Alternative N would be development according to existing zoning without a coordinated development plan for the site. Under Alternative N, Mission Bay gradually would develop the appearance of a business park with low-rise structures occupied by a mix of light industrial, distribution, warehousing, and business-support service uses, small office businesses and some retail activity. Alternative N would provide the most long-term options in Mission Bay for businesses similar to existing operations in the Project Area. (Chapter VII. Variations on Alternatives, p. VII.1, discusses a housing variant of Alternative N.)

Implications for Employment and Job Opportunities in Mission Bay/46/

The land use programs compared above would have different impacts on business activity, employment and the types of jobs and job opportunities in the Project Area. The Alternatives differ in the mix of types of businesses and amount of employment expected in the area in the future. Because the Alternatives would develop over many year, business activity and employment impacts would occur gradually over time.

Permanent Employment

2000. Table V.5, p. V.34 and Table V.6, p. V.35 present scenarios of commercial space and employment by use for the Mission Bay Alternatives in 2000. The year 2000 scenarios are described on pp. V.36-V.37.

Under all Alternatives, total employment and job opportunities in the Project Area would increase substantially by the year 2000 (see Table VI.B.29). The types of jobs in the Project Area, represented by the occupation and wage/ salary categories shown in Table VI.B.29, also would change over time. The magnitude of increase in jobs as well as the range of types of opportunities for workers with various qualifications would depend on the Alternative for development of Mission Bay.

Table VI.B.29 presents the numbers in various occupation and wage/salary categories for each Alternative in the year 2000. The description of what each Alternative means for types of employment and job opportunities is presented in the following section, "Build-out/2020," where implications of different land use programs are described. In general, the same comparative discussion applies for the interim analysis year, though differences between Alternatives are more pronounced in the comparison of build-out conditions.

TABLE VI.B.29: OCCUPATION AND WAGE/SALARY CATEGORIES FOR JOBS IN MISSION BAY, BY ALTERNATIVE, 1985 AND 2000

		Alternative A		Alternative B		Alternative N	
Categories	1985	2000	1986-2000	2000	1986-2000	2000	1986-2000
Occupational							
Professional/Technical	70	2,120	+2,050	1,155	+1,085	1,370	+1,300
Managerial/Administrative	220	1,710	+1,490	920	+700	1,190	+970
Clerical	235	2,605	+2,370	1,385	+1,150	1,760	+1,525
Sales	385	610	+225	385	--	735	+350
Service	100	1,220	+1,120	330	+230	465	+365
Crafts/Operatives/Other	990	1,665	+675	995	+5	1,590	+600
TOTAL	2,000	9,930	+7,930	5,170	+3,170	7,110	+5,110
Annual Wage and Salary (1985 Dollars)							
Less than $15,000	485	1,780	+1,295	910	+425	1,350	+865
$15,000 - 24,999	650	2,890	+2,240	1,470	+820	2,230	+1,580
$25,000 - 49,999	800	4,015	+3,215	2,205	+1,405	2,740	+1,940
$50,000 - 74,999	50	860	+810	390	+340	545	+495
$75,000 and above	15	385	+370	195	+180	245	+230
TOTAL	2,000	9,930	+7,930	5,170	+3,170	7,110	+5,110

SOURCE: Recht Hausrath & Associates

Build-Out/2020. Tables V.5, p. V.34 and Table V.6, p. V.35 present build-out scenarios for each Alternative for commercial space and employment by use. The build-out scenarios are described on pp. V.37-V.38.

The scenarios for build-out/2020 represent completion of development of the Alternatives. The different land use programs result in substantially different scenarios for business activity and employment. Alternative A, with the largest amount of commercial space (over eight million square feet of office, S/LI/RD, hotel, and retail space) would have the most employment (approximately 25,000 jobs) and the greatest variety in types of businesses. Total employment under Alternative N also would be large (approximately 17,000 jobs), about 70% of the total for Alternative A. Total employment would be large relative to Alternative A because the entire site would be developed for business use in Alternative N.

Employment under Alternative B would be relatively small (approximately 6,000 jobs), only about 25% of the total for Alternative A because a relatively small amount of the land in Alternative B would be devoted to commercial development.

Alternative A. Compared to the others, Alternative A would result in the largest increase in job opportunities in Mission Bay across all types of occupations (see Table VI.B.30). The types of jobs, in terms of occupation and wage/salary categories, would reflect the mix of business activity under Alternative A. Most jobs would be in clerical, professional/technical and managerial/administrative occupations. Those types of jobs dominate in office employment and also would be important components of the job mix for S/LI/RD activities. In addition, S/LI/RD activities would provide jobs in crafts, operatives and other occupations. The relatively large number of service jobs in Alternative A is attributable to the hotel in that Alternative.

The combination of business activities in Alternative A would result in opportunities with a broad range of skill, education and experience requirements, as indicated by the wage and salary levels (see Table VI.B.30). While there would be an increase in employment across all wage/salary levels, generally the Project Area would support relatively higher-paying jobs in the future than in 1985. The higher-wage categories show the greatest percentage increase in employment while the middle and lower-wage categories show the largest numerical increase. Hotel, retail and some office and S/LI/RD jobs would be at the lower end of the wage/salary range. About half the jobs in Alternative A

TABLE VI.B.30: OCCUPATION AND WAGE/SALARY CATEGORIES FOR JOBS IN MISSION BAY, BY ALTERNATIVE, 1985, 2000 AND BUILD-OUT/2020

		Alternative A			Alternative B			Alternative N		
Categories	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
Occupational										
Professional/Technical	70	2,120	5,880	+3,760	1,155	1,425	+270	1,370	3,070	+1,700
Managerial/Administrative	220	1,710	4,510	+2,800	920	1,070	+150	1,190	2,790	+1,600
Clerical	235	2,605	7,000	+4,395	1,385	1,575	+190	1,760	3,995	+2,235
Sales	385	610	1,650	+1,040	385	620	+235	735	1,600	+865
Service	100	1,220	2,020	+800	330	940	+610	465	1,015	+550
Crafts/Operatives/Other	990	1,665	3,920	+2,255	995	600	-395	1,590	4,780	+3,190
TOTAL	2,000	9,930	24,980	+15,050	5,170	6,230	+1,060	7,110	17,250	+10,140
Annual Wage and Salary (1985 Dollars)										
Less than $15,000	485	1,780	4,575	+2,795	910	1,330	+420	1,350	2,960	+1,610
$15,000 - 24,999	650	2,890	7,610	+4,720	1,470	1,855	+385	2,230	5,550	+3,320
$25,000 - 49,999	800	4,015	9,350	+5,335	2,205	2,345	+140	2,740	6,495	+3,755
$50,000 - 74,999	50	860	2,380	+1,520	390	480	+90	545	1,620	+1,075
$75,000 and above	15	385	1,065	+680	195	220	+25	245	625	+380
TOTAL	2,000	9,930	24,980	+15,050	5,170	6,230	+1,060	7,110	17,250	+10,140

SOURCE: Recht Hausrath & Associates

would have annual earnings of under $25,000 (1985 dollars). Those would include part-time jobs, entry-level jobs, and jobs with relatively basic skill and education requirements. A large percentage of jobs would be in the middle-level earnings category ($25,000-$49,999 per year). Alternative A's mix of office and S/LI/RD business activities would provide jobs representing opportunities for advancement across a wide variety of occupations. Most of the jobs (86%) would be held by middle- and lower-end wage earners, with a smaller number held by higher-paid, experienced managers, professionals, and skilled crafts workers.

Alternative B. The number of jobs and employment opportunities across all occupations would be lowest in Alternative B. The mix of types of jobs would be similar to that in Alternative A, representing a similar shift for the Project Area from jobs in transportation and industrial businesses to a broader mix of jobs including relatively more clerical, professional/technical and managerial/ administrative occupations.

In other occupational groups there would be only small changes. Over time, the number of jobs in crafts, operatives and other occupations would decline under Alternative B. Compared to Alternatives A and N, Alternative B, with its emphasis on residential development, would not provide opportunities for continued expansion of those types of jobs.

The pattern for wages and salaries and commensurate skill, education and experience requirements for jobs in the Project Area would be similar to that for Alternative A, although the number of jobs of various types would be less. There would be fewer entry-level jobs.

Alternative N. The mix of types of jobs in Alternative N reflects the same office components as in Alternative B, in addition to the broader range of opportunities offered in M-2 business activities. As in Alternatives A and B, most jobs would be in clerical, professional/technical and managerial/administrative occupations. Many of those jobs would be associated with the one block of office development. The mix of light industrial, distribution, business-support services, and small office operations in M-2 Industrial space also would provide some of those types of opportunities. Most businesses require some management and/or clerical personnel, and light industrial businesses employ technical personnel. A relatively large number of jobs in businesses similar to those now operating in the Project Area (Port-Related/M-2) plus an increase due to new businesses results in the relatively large number of crafts, operatives and other jobs. There would be more jobs in those occupations under Alternative N than under Alternative A, even though there would be more total jobs under Alternative A.

As would the other Alternatives, Alternative N would provide jobs across a range of earnings and skill levels. Most opportunities would be in jobs earning less than $25,000 per year (1985 dollars), indicating substantial opportunities for those who need training and experience. There also would be a large number of middle-level jobs, with wages/salaries between $25,000 and $50,000 per year. The number of opportunities across all types would be between those in Alternative A (most) and those in Alternative B (least).

Construction Employment

Development of Mission Bay would generate construction jobs in San Francisco. Over the build-out period, site preparation and infrastructure improvements would require construction labor as would commercial and residential building development. In addition, the construction process would require project management and supervisory personnel./47/

Construction employment generated by Mission Bay development would offer a wide range of job opportunities for workers in various skill levels. Project management and supervision would require workers with skills in management, design and engineering, personnel, and other functions, as well as clerical workers. Actual construction work for the large-scale development proposed for Mission Bay under all of the Alternatives would span a range of activities requiring both skilled and unskilled workers. The long-term (30-year) nature of the construction work at Mission Bay would provide an opportunity for training programs in a variety of aspects of construction. Entry-level workers could be trained at Mission Bay and could move up within their craft in the context of the on-going development of the Project Area. Construction jobs offer relatively high wages for those with skills. Large amounts of construction such as that associated with development of Mission Bay provide a means of improving skill-levels and enhancing earnings. Alternative A, with the most requirements for construction labor, would provide the most of those opportunities. Alternative N would provide the least (only about one-third of the amount in Alternative A). Alternative B would provide a large number of opportunities, though fewer than Alternative A (about 75% of the amount in Alternative A).

2000. Construction employment would be part of the overall employment picture for the Alternatives at the interim analysis year because of on-going development of the site.

There is a line-item on Table V.6, p. V.35, showing an estimate for on-site construction employment in 2000. That estimate illustrates the general level of construction employment in any one year during the course of the development period. Because major infrastructure items to prepare the site for the first phases of development (removal of the I-280 freeway stub and construction of new ramps, CalTrain relocation, MUNI Metro extension, channel improvements, new channel bridge) are assumed to be completed by 1995, construction employment associated with those activities would be lumped in the early years of the development period. For most of the period, therefore, construction would be generated by phased infrastructure (streets, sewers, utilities, landscaping, etc.), site preparation and building development. The estimate for construction employment in 2000 represents an annual average of total person-years associated with those on-going aspects of site development.

The mix of occupations and earnings associated with average annual construction employment in Mission Bay is incorporated in the occupation and wage/salary distributions in Table VI.B.29, p. VI.B.84. The estimate of average annual construction employment is included in the number of total jobs in the Project Area in 2000 shown in that table. As noted above, construction activity employs managerial and clerical personnel as well as workers in crafts, operatives and other occupations. Wages and salaries range from low for entry-level, unskilled workers to moderately high for skilled crafts workers. Over the course of the development period, construction activity would be an important source of jobs and job opportunities in the Project Area.

Differences between Alternatives at the interim year parallel those for the complete build-out period. Alternative A would have the most construction employment on an annual basis, followed by Alternative B, and Alternative N, with the smallest amount.

Build-Out/2020. Table VI.B.31 shows total construction employment generated by the Mission Bay Alternatives over the course of the 30-year build-out period. That is the total number of person-years of construction labor required for development of the Alternatives. Alternative A would generate the most construction employment, about 13,000 person-years in total. Alternative B would generate somewhat less construction employment, about 10,000 person-years. Alternative N would generate a smaller number of construction jobs compared to the other Alternatives, about 4,000 person-years.

The differences in construction employment between Alternatives are due to characteristics of the overall development scheme in each, as well as to the type of

TABLE VI.B.31: MISSION BAY CONSTRUCTION EMPLOYMENT THROUGH BUILD-OUT, BY ALTERNATIVE (Person-Years)

	Number of Person-Years of Construction Employment		
	Alternative A	Alternative B	Alternative N
Construction Activity			
Person-Years due to Building and Related Development	9,500	7,100	2,900
Person-Years due to Infrastructure Development	1,100	1,200	600
Project Supervision/Management	2,100	1,600	700
TOTAL	12,700	9,900	4,200

NOTE: Construction employment is measured in terms of person-years of construction labor, not numbers of workers. A person-year is equivalent to one construction worker's labor, full-time, for one year. See Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.43-XIV.B.48, for procedures and assumptions used to estimate Project Area construction employment.

SOURCE: Recht Hausrath & Associates

development in the various land use programs. Alternatives A and B show about the same amount of construction employment due to infrastructure development; both would require many of the same basic improvements such as removal of the I-280 freeway stub, new freeway ramps, CalTrain Station relocation, MUNI-Metro extension, China Basin Channel improvements, new bridge at Owens Street, sewers, utilities, streets, and landscaping. Alternative N on the other hand would not require the same degree of infrastructure improvements. The difference in construction employment between Alternatives A and B primarily reflects differences in total amount of development; Alternative B, with more of the site devoted to open space, would have less building development overall than Alternative A. Different building types (office and S/LI/RD vs. residential) do not make much difference in the estimates. The relatively low construction employment estimate for Alternative N reflects the smaller total amount of building development as well as the nature of the development product under that Alternative: lower-rise lower-cost structures than would be developed under either Alternatives A or B.

Employment Benefits to the Labor Force

The labor force would benefit from development of Mission Bay. This section considers Mission Bay employment opportunities from the perspective of the labor force.

Generally, job growth means more people are employed. Employment growth provides opportunities for advancement and opportunities for employment of those formerly unemployed. Job growth results in lower unemployment rates (see pp. VI.B.48-VI.B.49). The labor force benefits from job growth.

Employment opportunities in the Project Area would continue to occur over time. Not all Project Area employment would represent job openings initially since some businesses would move there from other locations, bringing existing employees with them. Employment opportunities or openings would occur as Project Area businesses grew and expanded and as a result of on-going job turnover (whereby openings occur as people are fired or quit their jobs for other employment or to leave the labor force). It is estimated that about 25% of Project Area employment would represent job openings each year./48/ Job openings provide opportunities for those already employed (who seek advancement, a different job, a different work location, or a new career). They also provide opportunities for the unemployed who are seeking work (including those new to the area, those new to the labor force, and those re-entering the labor force, as well as those who have been fired, laid-off or who have quit their jobs).

For the Alternatives, the number of employment opportunities or job openings each year would depend on total employment under an Alternative. The types of workers employed would depend on the mix of types of jobs in terms of occupations and wages/salaries (see p. VI.B.83).

Jobs in the Project Area would employ San Francisco residents as well as residents of other parts of the region. It is estimated that about half of the jobs in Mission Bay would be held by City residents in the future. That percentage reflects the pattern for jobs in the Downtown & Vicinity and the cumulative analysis of future citywide employment and employed residents. Generally, the number of City residents employed in Mission Bay would depend on total employment in the Project Area under each Alternative: the more total employment, the greater the number of City residents employed. In addition, the amount of housing added in an Alternative would have an effect (more housing would increase the percent of jobs held by residents) as would the mix of types of jobs (retail, hotel and service jobs tend to employ proportionally more City residents than office and S/LI/RD activities).

2000

The employment benefits of the Alternatives are compared below under the heading "Build-out/2020." Since employment would be added over time as the Alternatives developed, there would be employment benefits in the interim years as well, although the magnitude would be less than at full occupancy.

Build-Out/2020

Alternative A. Alternative A would offer the most benefit to the labor force. Alternative A would accommodate the most job growth and employ the largest number of people in the Project Area. Alternative A would employ people with the broadest range of skills and experience since it has the greatest mix of types of jobs and business activities and the most opportunities in construction period employment. Of the Alternatives, A would employ the most City residents. On an annual basis, about 6,200 job openings due to turnover would occur in the Project Area once Mission Bay was fully occupied.

Alternative B. Alternative B would accommodate job growth and provide employment benefits. Among the Alternatives, it would employ the smallest number of people on a permanent basis in the Project Area because it consists of housing and open space primarily. During the build-out period, Alternative B would offer a relatively large number of opportunities in construction employment, however. At full occupancy, there would be about 1,500 job openings a year in the Project Area due to turnover. Alternative B would employ City residents, but, of the Alternatives, it would employ the smallest number of residents.

Alternative N. Alternative N also would accommodate job growth and provide employment benefits in the Project Area. Among the Alternatives, Alternative N would provide more employment benefits than Alternative B and fewer than Alternative A. The opportunities in construction period employment would be lower than those in both other Alternatives. On an annual basis, about 4,000 job openings due to turnover would occur in the Project Area at full-occupancy. Compared to Alternatives A and B, Alternative N would provide the most opportunities for people in crafts, operatives and other laborer occupations. Alternative N would employ City residents, less overall than would Alternative A but more overall than would Alternative B.

Implications for Existing Land Uses in Mission Bay

Overview of Project Area Business Transition and Location Options

A number of factors complicate the discussion of displacement and relocation for existing land uses and business activity in the Mission Bay Project Area. The factors relate to business decisions, expectations and location options. They are mentioned here to provide context for the subsequent comparison of effects of the Alternatives. That discussion of implications for existing land uses identifies effects for specific business activities and raises issues related to the future for groups of activities serving certain specialized functions.

During the long build-out period for Mission Bay, there would be many changes for businesses now operating in the Project Area. The transition would be gradual and would be expected even without a new master plan, revised zoning and major development efforts in the Project Area. That transition is illustrated by the scenario for long-term Mission Bay development under existing zoning (Alternative N). Although the land use designation remains the same in Alternative N, the types of businesses in the Project Area would change over time.

The expected transition follows a long-term pattern of decline in distribution, warehousing and associated transportation activities in the Downtown & Vicinity as access deteriorates with increasing congestion and other locations become more convenient to markets served. Eventually, for some businesses, peripheral locations become more desirable than central locations.

Businesses in Mission Bay would be making location decisions over the course of the build-out period based on market or client considerations, expansion needs, comparative space costs, and numerous more individualized factors. The transition would occur gradually as businesses judged the comparative advantages and disadvantages of Mission Bay for the continued conduct of their business operations.

Most businesses in the Project Area located there after the prospect for future development was announced in 1981. For such operations, the Mission Bay location makes good business sense, even with the potential for eventual relocation. Many are businesses without substantial investment in buildings or equipment. The relatively new tenants are taking advantage of low rents offered by Santa Fe Pacific Realty Corporation (SFP) on a month-to-month basis pending future development of the site. The businesses have chosen to locate in the Project Area because of favorable rental rates and on the assumption that the potential development process would take a long time to complete. Most tenants on Port of San Francisco property in the Project Area also hold month-to-month leases at favorable rental rates. Many also are new to that location east of Third Street. As with many of the SFP tenants, most of the operations on Port property do not have substantial investments in buildings or equipment.

There are other businesses in the Project Area with somewhat different expectations as to their future in the area and with a greater degree of investment in facilities in that location. That group includes businesses that have operated in the Project Area for many years. Some establishments own their land and/or the buildings out of which they operate. Others have been tenants in the Project Area for many years; some hold leases that extend for many years into the future./49/

Some Project Area businesses may have limited location options because of special access or facility requirements for their operations. Construction-related businesses involved in materials-processing and storage require ample land area at a reasonable cost close to downtown construction sites. Some of those operations in the Project Area also depend on rail service. Project Area businesses that support the City's maritime industry include trucking and warehousing operations, container freight stations, maritime equipment supply, and ship maintenance and repair services. They also require good rail access and service, proximity to the waterfront, ample land area for storage, and proximity to specific equipment or infrastructure. Other businesses in the Project Area could have difficulty finding a new location because it would be difficult to replicate the conditions they currently enjoy in the Project Area: large amounts of land and the ability to operate what could be considered "nuisance" activity (e.g., auto storage and wrecking, tank cleaning and waste disposal) without interference from neighbors concerned about noise, appearance or land use compatibility.

It is difficult to predict the relocation decisions of specific businesses. While a few may have difficulty finding an alternative location, most present-day Mission Bay businesses would not, although they may have to pay more for space than they do now. The comparative advantages of various location options would become more apparent as Project Area development progressed.

Many would remain in San Francisco; others would find better deals outside the City. Mission Bay businesses likely to stay in San Francisco would be those serving specialized markets (such as downtown) or those with a variety of linkages to other City business activity. Not all Mission Bay businesses would choose to continue to operate in San Francisco, however. For those not primarily oriented to other activity and customers in San Francisco, both older and newer light industrial / distribution centers and business parks in San Mateo County, Alameda County and areas further from San Francisco offer space, cost, access, and other features that compare favorably to options in the City. For many Project Area maritime-related operations, East Bay locations near the Ports of Oakland or Richmond could be location options that made sense from a business perspective.

Within San Francisco, older industrial areas south and to a lesser degree west of the Project Area would offer features attractive to Mission Bay businesses. Those include: relatively low space costs, open land area for loading and storage, proximity to other related businesses, proximity to the Port's container cargo terminals, rail freight service and freeway access. Locations in the Lower Potrero / Central Bayfront, Inner Mission and South Bayshore areas would be future options for present-day Mission Bay businesses. Some may consolidate in facilities they already operate in those areas. For businesses that serve customers in the Downtown & Vicinity, relocation further from that area may add time and cost to the service they provide. Those costs could be passed along to customers in the form of higher charges.

For example, for construction-related operations, locations further south in San Francisco or outside the City could provide the required land area and facilities (including rail service). The result of relocation further from the Downtown & Vicinity could be higher transportation and other costs associated with the service to downtown construction that those operations provide.

Similarly, for Project Area maritime-related businesses there could be some other options along the waterfront to the south of Mission Bay. Some maritime-related businesses would have difficulty finding an acceptable substitute location elsewhere in the City, however. Providing for the continued operation of maritime-related activities in the City might require public agency involvement and planning since those businesses have little flexibility in locations and may require special facilities or infrastructure; they are sensitive to space costs and may require subsidies. Although it might make good business sense for some maritime-related operations to relocate outside the City, the future for the City's overall maritime program may depend on retaining some of those operations on Port of San Francisco property. (See p. VI.B.101, for more discussion of maritime-related business activity in the Project Area.)

2000

By 2000, the overall transition described above would be underway. Some former Mission Bay Project Area businesses would no longer be there because new development required them to relocate. Other businesses would leave because on-going site preparation and other construction activity in the Project Area made continued operations difficult or impossible. Figures V.4-V.6 (pp. V.30-V.32) illustrate potential scenarios for the location of development in 2000. Businesses located where new development had occurred or where construction was underway would have relocated early on. In addition, site preparation and the need to develop through-streets would require more of the site to be disrupted than is shown on the maps.

Alternative A. Alternative A would result in the most extensive effects on existing businesses by 2000. The only areas where existing businesses would be likely to remain beyond 2000 would be in blocks south of 16th Street west of Third Street and in the middle blocks east of Third Street. The Alternative A development pattern by 2000 would mean that existing businesses representing about 1,300 workers would no longer be in the Project Area, a decline of about 75% in employment of the type formerly characterizing the Project Area in 1985.

Many of those businesses, particularly in the central portion of the Project Area west of Third Street, are SFP tenants with month-to-month leases, whose expectations include eventual relocation from Mission Bay. Others, particularly those in parts of the east-of-Third-Street area that are developed by 2000 under Alternative A, are tenants with leases that extend beyond the year 2000 or businesses with substantial investments in facilities and equipment and businesses that may have difficulty finding acceptable alternative locations.

In Alternative A, maritime-related activities, construction-related businesses and other operations that have limited location options would be affected by Mission Bay development earlier in the development process than they would in the other Alternatives (see discussion of maritime-related activity, p. VI.B.101). Because of particular functions performed by those businesses and limitations on their location options, special planning and intervention by various agencies may be required to secure their continued existence in the City if not in Mission Bay.

Other specific land uses in Mission Bay would be affected by Alternative A development through 2000:

- Train station and rail operations: In Alternative A, the CalTrain station would be relocated from Fourth and Townsend Streets to Seventh and Channel Streets. In addition, CalTrain maintenance facilities (and associated employment) currently located in the Project Area would be relocated south of Mission Bay. VI.E. Transportation, pp. VI.E.101-VI.B.102, discusses the implications of relocating the CalTrain station.

- San Francisco Recreational Vehicle (SFRV) Park: The SFRV Park uses the full block bounded by Third, Fourth, Townsend, and King Streets in the northeast corner of the Project Area. Given its location near the South of Market office district and the China Basin Building, that block is a prime site for office development. The block would be developed for office use in Alternative A. Consequently, the existing SFRV Park would be displaced by new development early in the Mission Bay development process. (The SFRV Park lease with Santa Fe Pacific terminates in 1991.) If the SFRV Park were not relocated somewhere else in the City, then San Francisco no longer would have that type of lodging option for visitors to the City.

Initial Phase of Development. In the initial phase of Mission Bay development under Alternative A, effects on existing uses would be more limited. The initial phase includes development of the SFRV Park for office space and consequently would involve displacement of that use. Initial phase housing, open space and retail development would affect some of the existing businesses south of the channel west of Third Street in the vicinity of Fourth Street and the channel, although most of the area proposed for the initial phase is vacant or unimproved. Since development east of Third Street in the initial phase would be limited to a small area between 15th and 16th Streets along the eastern boundary of the Project Area, there would be minimal effects on existing businesses. The land is part of the ATSF China Basin Yard.

Alternative B. The effect of Alternative B development by 2000 on existing Project Area businesses would be similar to the effect of Alternative A, but more limited in scope. Disruption of the Project Area for new development to the year 2000 would be limited to areas west of Third Street. Although the year 2000 map shows development concentrated in the western part of the Project Area, development of streets and site preparation for subsequent phases would disrupt most of the central portion of the site west of Third Street. In contrast to Alternative A, Alternative B would leave the area east of Third Street to later phases of development beyond 2000. Because the east of Third area would remain relatively undisturbed by new development through 2000 in Alternative B, a smaller amount (about 60% versus 75% in Alternative A) of existing employment would be gone. The potential problems identified for Alternative A related to businesses with longer-term expectations or special location requirements would not arise until later in the development process under Alternative B.

The comments on specific land uses (train station and rail operations and SFRV Park) under the Alternative A heading apply under Alternative B as well. In Alternative B, the CalTrain station would be relocated to Seventh and Channel Streets and the CalTrain maintenance facilities relocated south of Mission Bay. The SFRV Park would be developed for housing as would all blocks north of the channel in Alternative B.

Initial Phase of Development. Development in the initial phase of Alternative B would be limited to areas west of Third Street adjacent to the relocated CalTrain station. Although much of the area shown to be developed in the initial phase is currently unimproved or vacant, there would be impacts on a few businesses with month-to-month leases. There would be no development north of the channel in the initial phase of Alternative B. Consequently, the SFRV Park would not be affected by the initial phase of this Alternative.

Alternative N. In Alternative N, transition in business activity and employment would be less dramatic than in the other Alternatives. Since the pace of new development would be slower under Alternative N than the other Alternatives, fewer existing businesses would be disrupted. The relatively small loss of employment of the type currently located in Mission Bay would represent a decline of about 5%. Tenants with longer-term leases and other businesses with substantial investments in buildings or equipment in the Project Area would be able to remain in the Project Area for as long as it made good business sense to continue at that location.

Some of the decline in employment represents displacement of the SFRV Park. As allowed under C-M zoning, that block would be developed for office use by 2000 in Alternative N.

The effects of Alternative N on CalTrain operations in the Project Area would be different from those of the other Alternatives. In Alternative N, CalTrain tracks and station would remain in their current locations with the station at Fourth and Townsend Streets. MUNI-Metro would be extended to meet CalTrain at the Fourth and Townsend station. CalTrain maintenance facilities and associated employment also would remain in the Project Area. The I-280 freeway stub would be removed.

Build-Out/2020

Alternative A. By build-out of Alternative A, transition in the Project Area would be complete as new uses replaced the existing range of activities. Transition would be most dramatic in Alternatives A and B in which Mission Bay location options for activities similar to those currently operating in the Project Area would be most limited. Only a few would choose to locate in new S/LI/RD development because of the relatively high cost of that space compared to their other options and because the relatively high density of the new development would not suit their operations.

The implications of transition and relocation would be greater for some activities than others. It is unlikely that existing construction-related businesses would be accommodated in new Mission Bay S/LI/RD development. The density of development, relative rent levels and the types of space available under the Alternative A program would not be suitable for construction-related businesses with active materials-processing or storage functions. Reduced rail service (compared to current service) also could be a contributing factor in the relocation of such businesses from Mission Bay. Under Alternative A, businesses that support the City's maritime industry would not be accommodated in the Project Area over the long term. The same would hold for "nuisance" operations (e.g., auto wrecking and storage) considered annoying by residents and other businesses. Relocation of such businesses may require special planning because the type of site that Mission Bay provided (large land area, few restrictions on operations) is becoming more scarce in the City over time.

Alternative B. The Alternative A discussion of longer-term transition and relocation generally applies in Alternative B as well. Under Alternative B the issues would not be raised as soon as they would be under the Alternative A development program.

Alternative B would involve more overall transition in the Project Area east of Third Street compared to Alternative A. By build-out, residential and open space development would replace virtually all commercial development in that area, with the exception of a small segment of S/LI/RD development at the southern edge of the Project Area. Consequently, some existing commercial/industrial activity that has evidenced longer-term expectations for remaining in the Project Area, and that could be accommodated under the Alternative A development program, would not be accommodated in that location under Alternative B.

The berths in the China Basin Channel would be treated differently under Alternative B compared to the other Alternatives. Alternative B would retain 20 houseboat berths and reduce the pleasure-craft berths from 35 to 20. If the 15 pleasure-craft berths were not replaced at another marina in the City, then the overall supply of berths in San Francisco would be less under Alternative B than under the other Alternatives. In particular, there would be fewer lower-cost berths.

Alternative N. Alternative N would result in the least overall business transition in the Project Area. While new development in Alternative N would represent substantial upgrading of the area, some distribution, warehousing and transportation services operations that had a strong preference for a centralized San Francisco location (near the Downtown & Vicinity and accessible to other areas) and a willingness to pay higher costs associated with new construction could be potential long-term occupants at Mission Bay under Alternative N. Businesses with long-term expectations for the Project Area (longer-term lease holders or businesses that own their land in the Project Area) and those with substantial investments in facilities or equipment would be more likely to remain in the Project Area under Alternative N than under the other Alternatives.

Mission Bay would not continue to be the location of choice for businesses with more flexibility in operations and location requirements. The rents for newly developed light industrial space would be too high for those that had other options available at lower rents (e.g., other existing space or space further from the Downtown & Vicinity).

Since new development east of Third Street would be relatively restricted under the "Port-Related" designation in Alternative N, it would be more likely that activities similar to the existing mix in that area would continue to operate there over the longer term. That would include maritime-related businesses (see below, under the heading "Maritime-Related Activity/Port-Related Land Use").

Maritime-Related Activity/Port-Related Land Use

The land use programs of the Alternatives offer different opportunities for continued maritime-related operations in the Mission Bay Project Area. In the land use programs, the "Port-Related" land use designation identifies areas where maritime activities would be considered a primary use. Alternatives A and N show land with the port-related designation; Alternative B does not. For analysis in the EIR, it is assumed that container terminal development east of Third Street would not occur during the build-out period for Mission Bay. The Alternatives would have different effects on the longer-term potential for container terminal development in the vicinity of the Project Area. One of the Department of City Planning's Special Studies for Mission Bay, entitled "Container Terminal Options: Mission Bay, San Francisco," evaluates different container terminal options in San Francisco's Central Waterfront and discusses implications for Port operations and for Mission Bay./50/

Overall land use questions related to the port-related designation are discussed under the Build-out/2020 heading. The text under that heading also deals with longer-term (beyond 2020) options for container terminal development in the vicinity of the Project Area. By 2000, as described in the preceding section (see p. VI.B.96), the Alternatives would result in varying degrees of transition for maritime-related businesses, depending on the phasing of development as well as on the ultimate land use designation for the Project Area east of Third Street.

The issue of land use compatibility between the Mission Bay Alternatives and activities on adjacent piers is addressed in the section describing implications for Nearby Areas (see p. VI.B.115).

Build-Out/2020

Alternative A. In Alternative A, a small amount of land (6.5 acres) is designated for port-related use east of Third Street. The size of the area, its configuration and its location adjacent to residential development on one side and major open space on the other make it unlikely that active maritime uses could function efficiently there. The area could continue to be used as it is now as storage for maritime activities on piers adjacent to (though outside of) the Project Area as long as those remain in operation. Table V.5, p. V.34, shows land area in the port-related category under Alternative A; its storage function is reflected in the absence of any port-related employment under Alternative A, in the companion table (Table V.6, p. V.35).

Future container terminal development at Mission Rock / Pier 50 would require backland that would extend into the Project Area east of Third Street./51/ The five-berth container terminal proposal, outlined in the Port's report: "Conceptual Maritime Master Planning for the Southern Waterfront," would require all land between the piers and Third Street for backland. Alternative configurations for the Mission Rock / Pier 50 terminal would require substantially more of the east-of-Third-Street area than is designated port-related in Alternative A./52/ Consequently, Alternative A development of the Project Area east-of-Third-Street would preclude future container terminal development there.

It is possible that land exchange involving SFP, the Port of San Francisco and land in the vicinity of Piers 70 and 80 could occur enabling designation of the area to the south of the Project Area between Piers 70 and 80 as a container terminal site to substitute for the loss of the Mission Rock / Pier 50 site. Relocation of future container terminal development south of Mission Bay would not impair the Port's ability to handle potential future container cargo volumes. Consolidated container operations in the south could result in more efficient operations overall than would the more dispersed development program involving the Mission Rock / Pier 50 terminal outlined in the Port's current master plan./53/ If such a land exchange did not occur, Mission Bay development under Alternative A would reduce overall capacity for future container cargo handling in San Francisco. See Chapter V. The EIR Alternatives and Approval Process, p. V.42, for discussion of regional and state approvals related to the land exchange.

Alternative B. Alternative B proposes no port-related land use designation. Most of the area east of Third Street would be developed for residential and open space use. A relatively small amount of land at the southern boundary of the Project Area (6.0 acres) is set aside for S/LI/RD uses. Consequently, in Alternative B at build-out there would be no maritime or port-related activity in the Project Area. (Chapter VII. Variations on

Alternatives, p. VII.10, discusses a port-priority variant of Alternative B that replaces housing, open space, wetlands, and S/LI/RD uses east of Third Street with Port-Related/M-2 uses.)

The discussion of long-term container terminal options near Mission Bay under Alternative A applies in Alternative B as well. Since the alternative container terminal configurations all would require some if not all of the area east of Third Street for backland, Alternative B, with none of that area designated for port-related use, would preclude future container terminal development at Mission Rock / Pier 50. With a land exchange and designation of the area between Piers 70 and 80 as a container terminal site, there would be a substitute for the loss of the Mission Rock / Pier 50 site. If such a land exchange did not occur, Mission Bay development under Alternative B would reduce overall capacity for future container cargo handling in the City. See Chapter V. The EIR Alternatives and Approval Process, p. V.42, for discussion of regional and state approvals related to the land exchange.

Alternative N. In Alternative N, the entire area east of Third Street is designated Port-Related/M-2. The port-related part of the designation reflects intent to reserve that part of the Project Area for potential container terminal development in the longer-term future (beyond the time horizon for build-out in the EIR). All alternative configurations for a container terminal at Mission Rock / Pier 50 could be accommodated if the area east of Third Street were available for terminal development./52/

Under the Port-Related/M-2 designation, development east of Third Street in Alternative N would be limited compared to M-2 Industrial development west of Third Street. There would be fewer new buildings and the area would be less densely developed with more land remaining in open use for storage, loading or outdoor work areas. Existing businesses would remain east of Third Street longer under this Alternative than under the others. In terms of new development, some interim non-maritime activities would be allowed but only those that would not interfere with the longer-term plan for container terminal development.

It is unlikely that there would be a major increase in maritime-related business and employment in Mission Bay by 2020 under Alternative N even with the port-related designation east of Third Street. In the entire east-of-Third area, with one million square feet of low-rise building space and another 1.8 million square feet of land area for Port-Related/M-2 business use, Alternative N shows employment of about 1,100 in that category. That represents twice as much employment east of Third Street as there was in 1985, but not as much as could potentially locate there with fewer restrictions on types of activities and development allowed. Employment increase east of Third Street would be attributable to continued operation of activities similar to businesses currently located in the Project Area, modest potential expansion of those types of activities and smaller businesses (light manufacturing, sales and service, retail, office) moving into the area.

Retail Activity

Retail spending by Project Area residents and workers would support retail stores in the Project Area./54/ The amount of spending would vary between Alternatives depending on the amount of Project Area housing and commercial space. Spending by residents and workers from Nearby Areas and other parts of the City also would support Mission Bay retail space. Under all Alternatives, the amount of retail space in the Project Area would be larger than that supported only by Mission Bay workers and residents.

Consumer spending would support a mix of types of retail stores and eating and drinking places in the Project Area. Types of retail tenants and characteristics of the space would have some effect on the amount of spending captured in the Project Area. They also would affect the extent to which convenience shopping needs of residents were served by stores in close proximity to Project Area housing.

The overall relationship between retail spending and retail space in the Project Area is described for build-out/2020. By the year 2000, some of the inter-relationships described for build-out would be in evidence. Generally, however, retail activity would lag behind other aspects of Mission Bay development. Retail stores need assurances of an established market before opening a new outlet.

Build-Out/2020

Alternative A. At build-out, spending by Project Area residents and workers in Alternative A would support about 170,000 - 230,000 square feet of retail space in the Project Area, depending on the types of stores and eating and drinking places built./55/ That would represent the majority of the 250,000 square feet of retail space in Alternative A. The remainder of the space, about 20,000-80,000 square feet, would be supported by spending by people from outside the Project Area.

Given the large amount of housing proposed for Mission Bay in Alternative A and also planned for the South of Market area (at Rincon Hill, Yerba Buena Gardens and South Beach), and the fact that convenience shopping needs of existing residents (in South of Market and Potrero Hill neighborhoods) are not being fully satisfied nearby, it is likely that a neighborhood shopping center with a supermarket, drugstore and other convenience stores and services could be developed in the future in Mission Bay or another location nearby. If developed in Mission Bay, a neighborhood center would capture a large share of convenience spending by Mission Bay residents. Consequently, they would be able to satisfy their convenience shopping needs close to where they lived. Without a center in Mission Bay, it is likely that a center would be developed somewhere nearby to serve both Mission Bay and the large number of other future residents in the vicinity. In that case, Mission Bay residents would have to travel farther to do most of their convenience shopping.

The total amount of retail space in Alternative A could accommodate large stores (supermarket, drugstore) typical of a neighborhood center although the configuration of the space, as illustrated on the map (see Figure V.1, p. V.12), may not be appropriate. Relatively small floor areas of ground-floor retail space beneath housing may not provide large enough spaces with accessible parking to attract and accommodate large-scale grocery or drug stores. Smaller-scale convenience stores could be located along neighborhood shopping streets such as those in Alternative A, however. Since large stores have the ability to offer more affordable pricing through economies of scale and more selection through larger inventories, many residents of Mission Bay, particularly those in moderate- and lower-income households, would do much of their shopping for basic necessities elsewhere if such stores were not available in the Project Area./56/

Alternative B. At build-out, spending by Project Area residents and workers in Alternative B would support about 160,000 - 210,000 square feet of retail space in the Project Area, depending on the types of stores and eating and drinking places provided./55/ Most of that spending would be by Project Area residents because the Alternative B land use program is devoted primarily to housing. Resident and worker spending would support more than half of the 300,000 square feet of retail space. The rest, about 90,000 - 140,000 square feet, would be supported by spending by residents and workers in Nearby Areas and other parts of the City.

There would be strong support for convenience retailing in the Project Area under Alternative B, given the large residential population. As described above for Alternative A, there would be support in Alternative B for a neighborhood shopping center to serve Project Area residents and residents of nearby areas. As in Alternative A, the amount of retail space in Alternative B is large enough to accommodate a center with large stores, although the configuration of space (relatively small spaces in storefronts beneath housing) may not provide the larger floor areas required with parking close by. Given the strongly residential character of Alternative B, it might be appropriate in that Alternative to provide for a neighborhood shopping center in Mission Bay to serve residents of both the Project Area and Nearby Areas by consolidating a larger amount of retail space on a large site where access would be easy.

Alternative N. At build-out, spending by Project Area workers would support about 40,000 to 60,000 square feet of retail space, about half of the 100,000 square feet included in the Alternative./55/ The other half of the space would be supported by residents and workers from outside the Project Area.

Compared to the other Alternatives, Alternative N retail activity would be oriented more toward the eating and drinking and convenience shopping needs of workers in the area and could include a large, free-standing store serving a large market area.

IMPLICATIONS FOR NEARBY AREAS

Mission Bay development would affect land use, business activity and employment in Nearby Areas. That would occur as the Mission Bay Alternatives influenced the acceptability and desirability of those areas for various types of businesses. Mission Bay Alternatives also would have different implications in terms of the amount and type of business activity and employment seeking space in Nearby Areas. The discussion in this section focuses on how the Alternatives would affect on-going development and change in Nearby Areas.

Development of Mission Bay under any of the Alternatives would represent an upgrading of the site that would have effects in the vicinity. In addition, new activities in the Project Area could be incompatible with continued operation of some activities in Nearby Areas. Differences between land uses in the Alternatives would result in different effects on Nearby Areas depending on whether those uses reinforced or conflicted with land use trends in adjacent areas.

Comparison between the Alternatives reveals how Mission Bay would affect the amount and type of new development and resultant changes in Nearby Areas. From the perspective of businesses evaluating locations, Mission Bay would be considered one of several options. If Mission Bay development accommodated demand for commercial space, there would be less demand in other locations. Conversely, if Mission Bay did not accommodate that demand, there would be more demand for development and change in other areas. The nature and extent of demand for space (whether for new development or for lower-cost existing space) affects rent levels and the willingness of existing businesses to either continue to operate and expand in the same area, or relocate.

Mission Bay development also could affect land use, business activity and employment in Nearby Areas by changing accessibility. Access for employees, trucks or rail service is an important part of many businesses' location decisions. Discontinuing or re-routing rail service as well as increased traffic congestion are examples of ways that access could be affected.

Effects on land use, business activity and employment in Nearby Areas would occur gradually over time as Mission Bay developed and as those areas changed. Most of the description, including highlights for each area, is under the heading "Build-out/2020" to focus discussion on what the Alternatives represent in their entirety. It is not to imply that effects would not happen until build-out, but rather to recognize that they would happen over the long term and generally would not be apparent early in the development process.

2000

Mission Bay development by 2000 under any of the Alternatives would not have much effect on development patterns and trends in business activity and employment underway in Nearby Areas (see p. VI.B.65 for description of the future context for those areas). The types of effects likely to occur by 2000 would be subtle. Although the Project Area would be only partially developed, expectations of future changes could affect business location and expansion decisions in Nearby Areas. On-going construction and site-preparation in Mission Bay are not expected to impair access for businesses in Nearby Areas.

There would not be much difference between Mission Bay Alternatives by 2000 in the types of effects on Nearby Areas. There would be some localized effects depending on where development and construction occurred. In all Alternatives, businesses along Townsend Street and Third Street north of the channel would feel the initial effects of Mission Bay development by 2000.

In the short-term, those effects most likely would be to increase the level of real estate and business activity in blocks adjacent to early Mission Bay development. There could be some upgrading in response to new Mission Bay development. Proximity to existing development would be important for marketing new Mission Bay space and would be one of the factors used to determine where the first phases of development would occur.

Alternative A is the only Alternative with development south of 16th Street before 2000. Consequently, areas south of Mission Bay would be candidates for transition earlier in the development process than in the other Alternatives. See discussion of the Lower Potrero / Central Bayfront area on p. VI.B.113 for description of the types of effects on land use and business activity.

Initial Phase of Development

In the initial phase of Mission Bay development under Alternatives A and B, effects on Nearby Areas would be even more limited. In Alternative A, development north of the channel would be part of the initial phase, beginning the upgrading and intensification of activity in the South of Market area along Townsend Street that would be a result of Mission Bay development under Alternative A. In Alternative B, the initial phase of development would be relatively isolated inside the Project Area and separated from the North Potrero area by the I-280 freeway and CalTrain tracks. Consequently, it is unlikely that there would be immediate effects in Nearby Areas.

Build-Out/2020

Land use, business activity and employment is expected to change over time in areas near Mission Bay, as described in the Future Context section, pp. VI.B.65 and VI.B.76. With all Alternatives, Mission Bay and areas near it would become more desirable to a broader range of business activities. Mission Bay development under each Alternative would upgrade and improve the site and its environs.

Depending on the land use program, the Alternatives would have different effects on development, business activity and employment in the Nearby Areas. Generally, differences between the Alternatives in Mission Bay office development result in more or less effects on areas of the Downtown & Vicinity to the north of the Project Area while differences in S/LI/RD or M-2 Industrial development result in more or less effects on Nearby Areas to the west and south.

South of Market and Other Parts of the Downtown & Vicinity

Areas to the south and west of the core of the downtown office district have become increasingly acceptable as locations for office development. Both back-office and small companies have been moving into the relatively low-rent office space developed in new buildings and converted structures. The areas between Mission Bay and the downtown core also house some older manufacturing and distribution operations as well as a mix of support businesses that serve activities in other downtown areas. The Mission Bay Alternatives would have different effects in the future on the amount and type of office activity in the areas between the Project Area and the downtown core and also on the mix of other types of activities in those areas.

Alternative A. Alternative A would provide a large amount (4.1 million square feet) of new office space in Mission Bay suitable for back-office uses. Mission Bay office space would attract office activities whose other location options included sites in the South of Market and South Van Ness areas and along Market Street towards Civic Center in the C-3 District. Because Alternative A would accommodate in Mission Bay a share of the demand for office space, there would be less pressure for new office development in those other areas.

With Alternative A, the pace of potential development and change in other parts of the Downtown & Vicinity (particularly South of Market) would be slower than with the other Alternatives. As a result, space costs in general would remain low relative to those in the downtown core and more existing space would remain available. There would be more options for smaller-scale office activities as well as service and light industrial activities.

With respect to the proposed South of Market Plan, Alternative A would support the Plan's concentration of office development along Townsend Street./57/ Mission Bay office development in Alternative A would have a strong office identity, attracting other office development to the southernmost South of Market, resulting in more intensive office development in that location than the other Alternatives without large amounts of Mission Bay office space along Townsend Street. The result might be somewhat higher office rents and different types of office activities using the space in that area than would be the case without adjacent Mission Bay office development. Alternative A also would leave more existing buildings along Second Street for relatively low-rent office use, since it would accommodate a large amount of office activity in Mission Bay. That, in turn, would relieve some pressure to convert existing space in those areas of the western South of Market proposed to be reserved for non-office uses.

Compared to the other Alternatives, Alternative A would do the most to support the preservation of space for service and light industrial activities operating South of Market, in the South Van Ness area, and along blocks of Mission and Howard Streets towards the Civic Center area. Alternative A would provide the most location options in the Project Area for businesses (both office and non-office) that otherwise would look for space in those other areas near the downtown core. As noted above, by providing large amounts of office space in the Project Area, Alternative A would result in the continuation of relatively low space costs in South of Market office locations. That would enable rent-sensitive office businesses to locate and expand in those designated areas instead of in space converted (without permits) in areas to be reserved for service and light industrial activities.

Over the longer term, however, Mission Bay development under Alternative A could contribute to increased rent levels in the areas between the Project Area and the downtown core. As discussed below, such effects and associated impacts on existing businesses and rent-sensitive activities would be evident sooner with the other Alternatives, and for different reasons. In the other Alternatives (each of which provides considerably less space for office activity in the Project Area than does Alternative A), the reason is primarily that demand not accommodated in Mission Bay would result in relatively more demand and, consequently, relatively higher rents, for space in areas between the Project Area and the downtown core. In Alternative A, pressure to increase rents and convert existing uses to capitalize on the increasingly "downtown" character of the area would be a longer-term outcome, attributable to the mixed-use character and relatively intense level of activity represented by the land use program for Alternative A.

Alternative B. Alternative B would result in a relatively small amount (one million square feet) of office space in Mission Bay. Office development located along the western boundary of the Project Area would be far removed from other office locations and separated from the South of Market office district by Mission Bay residential development north of China Basin Channel. Because there would be demand for office space, and Mission Bay under Alternative B would not provide much, some office users would look to development in other office locations such as South of Market, South Van Ness, and the western C-3 District along Market Street. (Others would choose suburban locations outside the City, see p. VI.B.122.) With Alternative B, there would be more new office development and office employment in other parts of the Downtown & Vicinity than under Alternative A.

With Alternative B, the pace of development and change in locations in the Downtown & Vicinity outside Mission Bay that provide sites for office development would be faster than with Alternative A. Space costs in general would be higher and it would be more difficult for older businesses to remain in the area and for other lower-rent-payers looking for a relatively close-in location to find space South of Market.

Within the South of Market area, office development would occur along Townsend Street and Second Street as designated in the proposed South of Market Plan. Because Mission Bay would develop as a residential area on the other side of Townsend Street, the character of the Townsend Street office district would differ from that with Alternative A. Although there would be pressures for office development in the Downtown & Vicinity outside Mission Bay, Townsend Street would not be as major an office center with Alternative B as it would be with Alternative A. In other parts of the South of Market area, it would be more difficult to maintain relatively low-rent space for existing service, distribution and light industrial uses and start-up businesses in areas designated for such activities in the South of Market Plan, since smaller office businesses and others willing to pay somewhat more for the close-in location would compete for that space. Although office use would not be allowed by the proposed zoning in much of the South of Market area, those restrictions would be difficult to enforce, particularly for small, low-profile office businesses. With Alternative B, there would be relatively more demand and, consequently, relatively more incentive for conversions to office use without permits./58/

Alternative N. Some effects of Alternative N on other parts of the Downtown & Vicinity would be similar to those of Alternative B. Alternative N would provide the same amount of larger-scale office development in Mission Bay. Alternative N office development located at Townsend and Third Streets would complement the South of Market office district along Townsend Street, however./59/ As with Alternative B, there would be development pressures as well as more new office space and employment in other office locations since the amount of office development allowed in Mission Bay would be limited, compared to the amount allowed in Alternative A.

The large amount of new low-rise space (provided in Alternative N under the M-2 Industrial designation) that could accommodate a mix of light industrial and commercial businesses in Mission Bay would result in effects in the South of Market area somewhat different from the effects of Alternative B. There would be less demand for space South of Market from those activities. Consequently, development pressures and associated effects on existing lower-rent-paying businesses would not be as great South of Market with Alternative N as with Alternative B. Although there would be pressures due to new large-scale office development, the new M-2 Industrial space in Mission Bay under Alternative N would offer location options for other activities that otherwise would compete for South of Market space (e.g., light industrial, wholesaling, downtown support services, small offices), thus resulting in less demand in South of Market overall than there would be with Alternative B.

Showplace Square, North Potrero / Potrero Hill and Inner Mission/60/

The industrially zoned areas west of Mission Bay have been in transition as new economic activity has located there. The transition, involving a mix of business activities (showroom, light industrial/distribution, office, retail), has occurred independent of Mission Bay development, and would continue with any of the Mission Bay Alternatives. The Alternatives would have some effect on the direction for future expansion, however.

Although rail freight use has declined substantially, access to that service was an important location factor for some of the older businesses still located in the area. Under all of the Alternatives, rail freight service to areas west of Mission Bay would continue via the tracks along 16th Street west of Pennsylvania Avenue. Since development of Mission Bay would not impair rail access, businesses that continued to require it could continue in operation. Following the general trend of decline in rail freight demand in the area, however, that type of activity would not be expected to remain over the long term in any case. (See VI.E. Transportation, pp. VI.E.153–VI.E.156, for discussion of future rail freight service under the Mission Bay Alternatives.)

Alternative A. Alternative A would complement and reinforce the trend of revitalizing the older industrial areas with new business activity. S/LI/RD space would be occupied by uses similar to those already occupying rehabilitated industrial buildings and some new construction in Showplace Square and North Potrero / Potrero Hill. The result would be continued expansion of showroom and related activities east from Showplace Square towards Mission Bay. In particular, Alternative A would provide options for showroom and related development in S/LI/RD space at Townsend and Seventh Streets in the Project Area.

Alternative B. Alternative B would not provide space for the types of economic activity expanding west of Mission Bay. Therefore, growth of Showplace Square would be limited to areas west of the Project Area. As a consequence, the intensity of development and pace of change in the North Potrero and Potrero Hill areas would be somewhat greater than with Alternative A or Alternative N. Because Alternative B would provide limited opportunities for office development in the Project Area, there would be more demand for office space in peripheral parts of the Downtown & Vicinity contributing to more competition for space and differences in future activity in those areas compared to Alternatives A or N. There would be a greater tendency for showroom and related activity as well as small office businesses to expand in the Inner Mission with Alternative B. To the extent that expansion resulted in new construction and higher rents for existing space in that more-distant area, then older businesses and more rent-sensitive uses would look to locations further to the south and west, away from the Downtown & Vicinity.

Alternative N. Alternative N's effects on Nearby Areas to the west of the Project Area would be similar to Alternative A's effects. New M-2 Industrial space would complement adjacent showroom and related development. Showplace Square expansion would continue in the direction of Mission Bay.

Lower Potrero / Central Bayfront, Inner Mission and South Bayshore/60/

The old industrial areas south and west of Mission Bay have been changing slowly, particularly the Lower Potrero / Central Bayfront and Inner Mission areas. Large industrial facilities have gone out of business or moved further south or out of the City. Businesses moving in are low-rent payers, looking for existing rehabilitated space or new low-rise light industrial/distribution space. Mission Bay development would not affect the overall pattern of change, although there would be some variation attributable to differences between the Alternatives.

Alternative A. Alternative A would accelerate the trend of new business activity rehabilitating existing low-rent space in Lower Potrero / Central Bayfront. New commercial development (office and S/LI/RD) in Mission Bay under Alternative A would upgrade the image of that part of the City so the location would become increasingly acceptable. There also would be more business services and amenities making the area more attractive to employers and their workers.

The S/LI/RD space in Mission Bay under Alternative A would be the type of relatively low-rise, new development that otherwise might be built further south. To the extent that type of activity would be concentrated in Mission Bay under Alternative A, there would be less new development in industrial areas to the south. For some older industrial facilities, the result would be less pressure for redevelopment. For those older facilities close to the site, however, pressures for relocation to a site further from the Downtown & Vicinity or outside the City eventually would increase as the general upgrading and intensification of activity represented by Mission Bay development would attract more new businesses to the area, resulting in increased demand for new and existing space.

Alternative B. The types of effects of Mission Bay development under Alternative B on nearby industrial areas to the south and west would be similar to those described for Alternative A, but more pronounced. Because, as described above, Alternative B would result in more competition for space and, consequently, higher rents in areas to the north and west of Mission Bay, more of the rent-sensitive businesses in those areas would expand their location options to include Lower Potrero / Central Bayfront and, to a lesser degree, Inner Mission and South Bayshore. The pace of development and change, consequently, would be faster and more dispersed than with Alternative A. In addition, because Alternative B would not accommodate in Mission Bay the amount of new commercial/industrial space represented by S/LI/RD development in Alternative A or new M-2 Industrial development in Alternative N, some of that type of development would occur in industrial areas outside the Project Area. Demand from service and distribution businesses desiring a San Francisco location would support some new development that could result in relocation of some older existing land uses in those areas. Eventually, there would be relatively more changes in existing uses and older facilities near Mission Bay with Alternative B compared to the other Alternatives. In addition to the general upgrading represented by Mission Bay development, adjacent residential use in Mission Bay under Alternative B would create more pressure for change due to potential incompatibility with large-scale industrial or maritime operations.

Alternative N. Compared to the other Alternatives, Alternative N would have the least effect on the overall pattern of change in industrial areas south of Mission Bay. The large amount of relatively low-rent space in Alternative N would attract to Mission Bay some rent-sensitive businesses that would look for space further south or west with Alternatives A or B. There also would be less upgrading and overall change in the character of southeastern parts of the City with Alternative N.

Consequently, Alternative N would result in less pressure for redevelopment and relocation of older facilities. The pace of transition in Lower Potrero / Central Bayfront near Mission Bay and in the more distant South Bayshore and Inner Mission areas would be slower with Alternative N than with Alternatives A or B.

Piers Adjacent to Mission Bay and Consideration of Future Maritime Activity

The overall outlook for maritime and related activity and Port development along the southern waterfront is presented in the Future Context section, pp. VI.B.67 and VI.B.76. Generally, on piers adjacent to Mission Bay, the level of maritime-related activity is low and is not assumed in this EIR to increase substantially.

As the Port continues to focus large-scale maritime development to the south in the vicinity of Piers 80 and 94-96, and as Mission Bay becomes more intensively developed under all the Alternatives, piers adjacent to the Project Area would become less attractive for continued maritime-related operations. There would be some difference between Mission Bay Alternatives in effects on future development options and types and levels of activity for piers east of the Project Area.

Alternative A. The Alternatives representing the most land use change in the Mission Bay Project Area also would have most effect on adjacent piers. With Alternative A, housing, open space and S/LI/RD uses would be developed in Mission Bay east of Third Street. Operations involving substantial truck traffic and/or noise and facilities that continued operating at night would be incompatible with adjacent residential and open space development. Ship repair and maintenance and cargo handling operations now located on the piers adjacent to Mission Bay are relatively small-scale operations with fairly limited requirements for truck or rail service. The ship repair facility only operates during the day and there are days when there is no activity going on at all. A relatively low level of maritime activity such as that could continue for some time adjacent to Mission Bay. As housing was occupied and a residential neighborhood established across China Basin Street, it would become increasingly difficult for maritime uses to co-exist with Mission Bay development, however. Traffic congestion and other effects of increasing the density of population and employment in the area would make piers adjacent to Mission Bay less attractive to maritime activities in the future. In addition, once Mission Bay developed into a mixed-use community, piers east of the Project Area would become more valuable for commercial and recreational development. That was the pattern along most of the northern waterfront and at South Beach. Over the long term, the result could be pressure for development of the piers for non-maritime uses.

The finger piers adjacent to Mission Bay serve an important function for specialized bulk cargo (e.g., newsprint), as well as ship repair. If it turned out that the level of activity in those maritime operations was incompatible with nearby Mission Bay development under Alternative A, then relocation of those activities within San Francisco could be a problem. Locations further to the south in the Central Bayfront area would be potential options for relocation. Requirements of the newsprint operation (i.e., a finger pier location) might not be satisfied in the southern facilities, however. Moreover, if that part of the southern waterfront were to be developed intensively for container cargo operations in the longer-term future (see discussion below), the facilities for other maritime cargos may not be available. There is uncertainty about the future for various maritime activities in the City. Over the longer-term discussed here, changes in technology as well as other factors such as transportation can make a difference in the outlook. With Mission Bay development under Alternative A and with eventual container terminal development and expansion south of the Project Area, it might be difficult for specialized bulk cargo operations to continue to operate in the City.

Because the necessary backland east of Third Street would be devoted to non-maritime uses under Alternative A, it would be impossible to develop a container terminal facility replacing the piers adjacent to Mission Bay (see discussion regarding maritime activity in the Project Area, p. VI.B.101). It is possible that land exchange and land assembly could occur enabling container terminal development between Piers 70 and 80 that would substitute for loss of the option at Mission Rock / Pier 50 to Mission Bay. Relocation of future container terminal development to the south would not diminish the ability of San Francisco Port facilities to handle potential future cargo volume. The consolidated container facility between Piers 70 and 80 could result in more efficient cargo-handling operations than would the existing plan for more dispersed container facility sites./53/ If such a land exchange did not occur, Mission Bay development under Alternative A would reduce the overall capacity for future container cargo handling in San Francisco.

Alternative B. The discussion above for Alternative A applies for Alternative B as well. Alternative B, as a primarily residential community, represents an even greater land use contrast with maritime activity on adjacent piers. That could result in relatively more effects stemming from land use conflict and compatibility problems. (Chapter VII. Variations on Alternatives, p. VII.10, discusses a port-priority variant of Alternative B that replaces housing, open space, wetlands, and S/LI/RD uses east of Third Street with Port-Related/M-2 uses.) The Alternative A discussion of longer-term container terminal development at Mission Rock / Pier 50 also applies for Alternative B.

Alternative N. Land use conflict and compatibility issues raised by Alternatives A and B would not exist under Alternative N. Uses similar to those currently located there would occupy building space and land east of Third Street in Mission Bay. The level of activity would be low, with no major increase in employment expected. Consequently, maritime-related activity could continue on piers adjacent to Mission Bay. As expected in the Project Area east of Third Street, the level of activity would remain low; employment probably would decline over time.

In Alternative N, the Project Area east of Third Street would be designated Port-Related/M-2 to reserve the option for container terminal development in the longer-term future (beyond the time horizon for Mission Bay build-out in the EIR). Consequently, with the necessary backland available east of Third Street, piers adjacent to the Project Area could be redeveloped for future container terminal expansion under Alternative N./52/

Consideration of Retail Activity

There are two issues related to retail activity. One is whether retail establishments in Mission Bay would benefit residents and workers in nearby areas by expanding the range of retail and eating and drinking opportunities available to them. The other is whether Mission Bay retail establishments would have an adverse effect on nearby shopping areas by capturing business that otherwise would go to merchants in nearby areas.

All of the Alternatives would increase retail shopping and eating and drinking opportunities in the Mission Bay vicinity. Thus, future development of Mission Bay would expand the retail options available to residents and workers in nearby areas. The options provided could vary somewhat between Alternatives depending on future types of retail tenants in the Project Area.

The question of effects on nearby retail areas involves two considerations. One is the amount of spending generated by Project Area residents and workers. Project Area residents, particularly, would generate a large amount of retail spending; some would be spent in the Project Area and most would be spent in other parts of the City. For example, purchases of such items as apparel, home furnishings and appliances, and automobiles, could be made in the Union Square area, Stonestown, at the Auto Center, along Van Ness Avenue, and Geary and Bayshore Boulevards. Thus, Project Area residents and workers would support retail businesses in other parts of the City.

The other consideration is the amount and types of retail space developed in Mission Bay. Some of that space would be supported by spending of Project Area residents and workers and some by spending of residents and workers from nearby areas and other parts of the City. Thus, Project Area retail businesses would capture sales that would be made elsewhere in San Francisco if not in Mission Bay.

Comparison of spending by Project Area residents and workers in nearby retail areas with spending in the Project Area by people from elsewhere in the City provides an indication of the net effect of Mission Bay on retail activity in parts of the City. There would be differences between the Alternatives depending on the number of Project Area households and workers and the amount of retail space developed in the Project Area.

Alternative A. In Alternative A, retail spending by Project Area residents and workers in other parts of the City would exceed spending in the Project Area from workers and residents from other parts of the City. Thus, it is unlikely that Mission Bay retail development would have an adverse effect on businesses in other parts of the City, including those in nearby retail areas.

Generally, there would be a net benefit to retail businesses outside the Project Area because of the large residential population in Mission Bay under Alternative A. Outside the Project Area, spending would be distributed throughout the City with most going to major shopping areas. Nearby neighborhood shopping streets (e.g., those in Potrero Hill and the Mission) would attract Mission Bay resident spending. That would increase the level of retail activity in those areas and could increase the number of stores and the specialty orientation of foodstores and other shops and eating and drinking places in those areas.

Alternative B. The discussion above for Alternative A applies for Alternative B as well. Alternative B would provide an even larger amount of spending for Mission Bay and nearby retail streets because of the larger residential population in the Project Area.

Alternative N. Unlike the other Alternatives, Alternative N would depend relatively more on spending from a larger market area to support its retail space. Spending captured in Mission Bay from residents and workers from other parts of the City would be larger than spending by Project Area workers in retail businesses in other parts of the City. Because it is likely that Mission Bay retail space in Alternative N would be oriented towards large stores serving a broad-based market area, it would not compete directly with convenience or specialty retailing in nearby areas. Instead, retail space in Alternative N would represent expansion of the type of retailing that occurs in larger stores (discount outlets, apparel or hardware stores, etc.). Growth of that type of retail activity is expected in the southeast part of the City. With Alternative N, the development would occur in Mission Bay instead of somewhere else in that part of the City.

IMPLICATIONS FOR CITYWIDE AND REGIONAL GROWTH AND DEVELOPMENT PATTERNS

This section considers the Mission Bay Alternatives from the perspectives of citywide and regional economic activity and patterns of growth and development. It addresses the question of whether the choice of an Alternative would result in a more centralized development pattern with more employment in San Francisco or in a more dispersed pattern with more employment distributed throughout the region.

Chapter V. The EIR Alternatives and Approval Process identified Project Area business activity and employment for each of the Alternatives. It showed differences between

Alternatives in the number of jobs and types of business activity to be accommodated in Mission Bay (see Table V.6, p. V.35). Those differences would be reflected in different citywide and regional growth and development patterns, because, from the perspective of businesses evaluating locations, Mission Bay would be considered one of several options in the City and region. If Mission Bay development accommodated demand for commercial space, there would be less demand in alternative locations. Conversely, if Mission Bay did not accommodate that demand, then there would be more development and change in other areas.

Mission Bay could provide locations that compete with the suburbs for back-office, research and development and light industrial uses. Of those business activities, some would locate outside the City if not accommodated in the Project Area since there are few other competitive locations in San Francisco. Thus, Mission Bay development would affect total employment in the City depending on whether the Alternative provides locations that enhance the City's ability to compete with the suburbs. Alternatives that provide competitive locations result in more business activity and employment in San Francisco than Alternatives that do not. They result in a more city-centered development pattern and in less economic activity and development in the rest of the region.

Conversely, business activity and development would be more dispersed throughout the region if Mission Bay did not accommodate back-office, research and development and light industrial uses. Thus, there would be less growth and development in San Francisco and more change outside of the City with a Mission Bay Alternative that emphasized housing over commercial development as compared to an Alternative with more job growth.

Mission Bay also would provide locations that compete with other parts of San Francisco for office, showroom, service, and light industrial activities that value a San Francisco location and proximity to downtown. Those business activities would find other locations in the City if not accommodated in the Project Area given the large supply of commercially and industrially zoned land. In terms of growth and the pace of change and development in the City, the more employment and business activities of those types in the Project Area, the less in other parts of the City. Thus, to the extent that Mission Bay accommodates employment growth, it focuses development in the Project Area and results in less change in other areas of the City. Conversely, business activity and development would be distributed to other areas of the City if not accommodated in Mission Bay, resulting in more change in Nearby Areas outside the Project Area. Effects of these types are discussed earlier (see p. VI.B.106).

2000

The question of how Mission Bay development would affect City and regional growth and development patterns is addressed through comparison of the land use programs of the Alternatives, assuming that each would be fully developed. Consequently, the discussion is presented below under the heading "Build-Out/ 2020."

Build-Out/2020

Alternative A

Business activity and employment with Alternative A would be more concentrated in the Project Area than they would be with the other Alternatives; less activity and development would occur in other parts of the City and region. As such, Alternative A would result in the most centralized development pattern.

Alternative A would do the most to enhance the City's ability to compete with the suburbs for back-office and other rent-sensitive activities. Thus, it would result in the largest total employment in San Francisco (see Table VI.B.27, p. VI.B.77). The citywide employment scenario for Alternative A shows 9,200 more jobs than the scenario for Alternative B and 3,300 more jobs than the scenario for Alternative N.

While total employment in the City would be the most with Alternative A, that Alternative would result in less change in other parts of San Francisco outside the Project Area than would the other Alternatives. That is because the Project Area under Alternative A would accommodate business activity and employment that would locate elsewhere in the City (primarily in the various Nearby Areas) with Alternatives B and N (see discussion above under the heading "Implications for Nearby Areas", p. VI.B.106).

In summary, compared to the other Alternatives, Alternative A, with the largest amounts of Project Area employment, would concentrate development in the Project Area, thereby shifting economic activity that otherwise would occur in Nearby Areas and elsewhere in the region to locations in Mission Bay.

Alternative B

By giving priority to residential uses, Alternative B would provide few location options for businesses and employment growth in the Project Area. Thus, compared to the other Alternatives, Alternative B would result in more business activity and employment in other parts of the City and region and less in Mission Bay.

Alternative B would result in the lowest total employment in San Francisco (see Table VI.B.27, p. VI.B.77) and the most growth and development dispersed to different locations throughout the region. With Alternative B, there would be 9,200 fewer jobs in the City than there would be with Alternative A and 5,900 fewer jobs in the City than there would be with Alternative N. Almost all of those jobs would be located elsewhere in the Bay Area region with the scenario for Alternative B. They would be jobs in office, light industrial, research and development, and associated business service operations. Those types of businesses have many other location options in the region outside Mission Bay and San Francisco. Those alternative locations include the I-580/680 Corridor, Oakland, Emeryville, Alameda, Santa Clara County, and shoreline business parks in southern Alameda and San Mateo Counties. A relatively small share of the large amount of office and research and redevelopment activity that would locate in Mission Bay with Alternative A, would, under Alternative B, choose a location outside the region, e.g., near Stockton or Sacramento or in Southern California.

Not all of the difference between the scenario for Alternative B and those for Alternatives A and N represents differences in the location of economic activity throughout the region. Some of the difference would be evident in employment growth and development patterns in other parts of San Francisco. That is because some of the activity that would be accommodated in Mission Bay under the higher Project Area employment Alternatives (Alternatives A and N) would have location options elsewhere in the City outside Mission Bay. Consequently, with the scenario for Alternative B, those business activities would still be in the City, just not in the Project Area. That results in relatively more growth and change in Nearby Areas with the scenario for Alternative B.

Alternative N

Compared to Alternative A, Alternative N would accommodate less business activity and employment in the Project Area, with most of the difference being in office activities. With Alternative N, those activities would be located in other parts of the Downtown & Vicinity and outside the City instead, resulting in relatively more growth and change in those areas. Total employment in the City would be lower by about 3,300 jobs with Alternative N compared to Alternative A (see Table VI.B.27, p. VI.B.77). That difference represents more employment and development in other parts of the region with the scenario for Alternative N.

Compared to Alternative B, Alternative N would accommodate more business activity and employment in the Project Area, with differences in services, small office, light industrial, and port-related uses. By accommodating those uses in Mission Bay, Alternative N would result in less change and growth in the industrial areas west and south of the Project Area than would occur under Alternative B (that would not accommodate those uses in the Project Area). Alternative N also would keep more of those activities within the City than would Alternative B. Thus, there would be more total employment in the City with Alternative N than Alternative B (about 5,900 more jobs, see Table VI.B.27, p. VI.B.77). That difference represents less employment and less dispersed development throughout the rest of the region with the scenario for Alternative N.

MITIGATION

Measure	Alternative	Description
B.1	A,B	With Alternative A or B, there would not be sites in the Project Area for many of the types of businesses now operating in Mission Bay. Some existing Mission Bay businesses could have difficulty finding suitable sites elsewhere in the City. These would be businesses in construction- or maritime-related industries, businesses with substantial investments in buildings or equipment, and businesses requiring large amounts of open land, waterfront locations, access to rail service, or specific infrastructure and site conditions. To support the continued operation of such activities in the City, provide relocation assistance to those businesses with limited location options and specific site requirements.
B.2	A,B	Alternatives A or B would preclude future development of a container terminal at the Mission Rock / Pier 50 site designated for that use in the current Seaport Plan. To preserve future options for container terminal development in San Francisco, establish some means of achieving acceptable future container cargo handling capacity, such as a land exchange enabling substitution of a site in the vicinity of Piers 70 and 80 for the Mission Rock / Pier 50 site.
B.3	A,B	The configuration of the retail space in Alternatives A and B does not provide for the types of sites preferred by larger stores such as supermarkets or discount drug stores. The intensity of development and the number of residents and workers expected in Mission Bay with those Alternatives would support development of the larger convenience and discount stores typical of a neighborhood shopping center. To encourage this type of development in

Measure	Alternative	Description
		Mission Bay, revise the land use plans in Alternatives A and B to accommodate a site suitable for stores with large floor areas.

NOTES

SETTING

/1/ The primary source of the following information on land use, business activities and employment in the Project Area is the Mission Bay Project Area Business Survey conducted by Recht Hausrath & Associates in November and December, 1985. The survey approach was to interview representatives of all businesses in the Project Area and to supplement interviews with summary lease and land use information provided by major landlords (Santa Fe Pacific Realty Corporation and the Port of San Francisco). The Southern Pacific Transportation Company provided information regarding the commuter-rail operation. Maps and aerial photographs were used to derive some land use estimates. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.1-XIV.B.8, describes the survey methodology in more detail and provides more-detailed tables than those presented in the text.

The appendix section is an abbreviated version of the report "Existing Land Uses/Employment: Mission Bay, San Francisco" published in September 1986 by the San Francisco Department of City Planning as one of a series of special studies for Mission Bay.

/2/ Throughout this section, businesses, the land and building space that they use, and their type of employment have been categorized into business activity groups. These categories provide a more useful classification based on the function of business establishments and substitute for the Standard Industrial Classification (SIC) system used to classify employment in published statistics. The major benefit of this approach is that employment can be related to the types of space in which businesses are located and to factors that determine the location of business establishments. Businesses are categorized into business activity groups according to the primary function performed on-site. There are eight business activity groups in the Project Area:

- Transportation and Related Services: trucking and other freight and passenger transportation functions, including associated warehousing, repair and maintenance, and dispatch services;
- Wholesale/Distribution/Warehouse: wholesale sales, warehouse and delivery functions primarily for the establishment's own account;
- Vehicle/Equipment Storage: storage functions only, including those of repair, sales, transportation, and other businesses;
- Manufacturing/Construction: on-site production or processing functions;
- Office: administrative, management, clerical, and professional functions;
- Retail/Restaurant: retail stores and eating and drinking establishments;
- Arts/Design: studios/workshops; there are no live-work studios in the Project Area; and
- Other: miscellaneous functions that do not fit easily in other categories.

Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.2-XIV.B.3, provides examples of the businesses in these categories.

/3/ The Mission Bay Project Area analyzed in the EIR is larger than the Mission Bay Plan area. (Chapter III. Background and Area Description, p. III.4, describes the Mission Bay Plan, Proposal for Citizen Review, published in January 1987 by the San Francisco Department of City Planning.) The Mission Bay Plan area does not include two parcels east of Third Street that are encompassed in the Project Area totals presented in this EIR.

/4/ The Mission Bay Project Area Business Survey and site inventory identified 121 establishments using space in the Project Area. Information on 114 establishments was included in the final total for the business survey of establishments and employment. Three parking operations were not counted for enumerating establishments and employment because they had no employees based in the Project Area; the land area they use is counted in the land use tables as unattended general purpose parking. A business represented in the Project Area only by an easement also was excluded from the establishment totals. Three other establishments were not available for interview because they were moving (two into, and one out of, the Project Area). Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.1–XIV.B.8, discusses the survey and inventory.

/5/ Mission Creek Harbor Association Survey, conducted by Recht Hausrath & Associates, February and March, 1986. The survey consisted of two separate questionnaires: one for the houseboat residents and the other for the pleasure-craft members of the Association. Appendix C. Housing and Population, p. XIV.C.2, contains more detail on the survey scope and methodology.

/6/ The 1985 description of space by use and employment by business activity in the Downtown & Vicinity is based on analysis of citywide employment data, survey data, land use inventories, and information on recent land use changes resulting from new development. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.13–XIV.B.16, lists sources and describes how the 1985 estimates were derived.

The 1985 estimates represent updated information for the C-3 District and replace 1984 estimates in the Downtown Plan EIR. Appendix B. pp. XIV.B.24–XIV.B.26, provides a comparison of estimates and forecasts for the C-3 District in the Downtown Plan EIR with estimates and forecasts for the C-3 District prepared as part of the cumulative study area analysis for the Mission Bay EIR.

/7/ The categories used to define types of employment--business activities--are different from those often used in economic analyses. In place of broad standard industrial classifications of employment (recorded in published statistics), which combine diverse mixes of business functions, the analysis defines employment categories by the functions of business establishments. The major benefit of this approach is that employment can be related to types of space in which businesses are located and to factors that determine the location of business establishments. A primary example is the ability to identify and discuss office employment. Office employment cannot be identified from recorded statistics that present employment for standard industrial classifications (SIC codes). Using the SIC system, employment in office headquarters or data centers of large manufacturing companies is classified as manufacturing employment along with employment in production functions that are in industrial rather than office space. Similarly, office functions of utilities, oil companies and large retail stores are classified with production or sales functions even though they are large enough to be located in separate, office establishments. Business activities also are defined so that employment in the Downtown & Vicinity can be summarized by SIC and compared to citywide employment statistics.

Compared to the preceding estimates of space by use, the employment estimates are for more detailed business activities. Most of the business activity categories used in description of the Downtown & Vicinity excluding Mission Bay are different from those defined for the Project Area. They represent major types of economic activity in the area, while the categories for the Project Area were defined to provide more specific information relevant to description of that part of the City.

/8/ Office activity is a larger share of employment than it is of space because of the relatively high employment density (gross square feet per employee) associated with office activity compared to other uses. In other words, office activities generally require less space per employee than other activities.

/9/ The discussion is based on analysis of the 1972-1985 period because the California Employment Development Department (EDD) provides a consistent series of employment data from 1972, updated annually.

/10/ Vacancy rate data are from Coldwell Banker Real Estate Consultation Services, Office Vacancy Index of the United States, September 30, 1982. Information on office rents is from a survey of realtors and other persons knowledgeable about the office real estate market. That survey was undertaken by Recht Hausrath & Associates as part of background research for the Downtown Plan Environmental Impact Report (EIR), EE81.3, certified October 18, 1984.

/11/ Coldwell Banker, Office Vacancy Index, quarterly reports from March 1985 through December 1986.

/12/ Information on office rents is from a variety of sources, including: Building Owners and Managers Association of San Francisco, Square Footage: The Greater San Francisco Office Marketing and Leasing Guide, Volume One, 1986; Fuller Commercial Brokerage, "San Francisco Office Leasing Market Report," November 1, 1985; and Gallelli Real Estate, Inc., "Office Space Survey for the Downtown Financial District, San Francisco, California," June 1985.

/13/ San Francisco Department of City Planning, "Major Office Building Construction in San Francisco through 1983," March 15, 1983.

/14/ Recht Hausrath & Associates estimates based on Department of City Planning list of major office projects under review, approved, under construction, or completed as of the end of 1985.

/15/ Proposition M superceded the annual limit on office development approvals included in the Downtown Plan zoning ordinance. In that ordinance (effective October 17, 1985), Sections 320-323 were added to the Planning Code, establishing a total limit of 2.85 million square feet of additional office space for approval over a three-year period beginning October 17, 1985 (equivalent to 950,000 square feet per year). The Department of City Planning established procedures for an "Office Development Limitation Program" and conducted the first of six planned review periods from January through April 1986. Four projects representing about one million square feet of office space were considered in the first review period. The Planning Commission did not approve any of the four projects. A second review period scheduled for the fall of 1986 was cancelled.

/16/ In each approval period, at least 75,000 square feet of office development is reserved for buildings between 25,000 and 49,999 square feet of office space.

Dean L. Macris, Director of Planning, memorandum to the City Planning Commission, entitled "Proposed Rules for 1986-87 Approval Period of the Office Development Limitation Program," January 8, 1987.

/17/ Robert W. Passmore, Zoning Administrator, memorandum to the City Planning Commission, entitled "Certification of Office Projects Approved Since November 29, 1984 - Annual Limit Adjustment," January 7, 1987.

/18/ The employment estimates in this paragraph are from a variety of sources: Recht Hausrath & Associates employment analyses for the South of Market Rezoning Study and for the Mission Bay EIR; census tract data for San Francisco from Association of Bay Area Governments (ABAG) Regional Data Center, Projections '85 series; and Potrero Hill Community Development Corporation, "Potrero District Economic Development Inventory (Second Interim Report)," prepared for the Mayor's Office of Housing and Economic Development, September 1986.

/19/ The information in this section draws on survey data and economic analyses undertaken by Recht Hausrath & Associates (RHA) for the Department of City Planning's South of Market Rezoning Study. See San Francisco Department of City Planning, "South of Market Rezoning Study: Housing, Business Activity, Neighborhood Livability Research Findings," March 1985, pp. 53-97.

/20/ San Francisco Board of Supervisors, South of Market Industrial and Housing Conservation Special Use District, interim controls, Ordinance #574-23 adopted November 28, 1983.

/21/ This section is based largely on field work conducted in 1986 by Recht Hausrath & Associates for the Mission Bay EIR. The field work consisted of investigation of building conditions and development activity, as well as interviews with businesses, developers and realtors active in the area.

/22/ This section is based largely on field work conducted in 1986 by Recht Hausrath & Associates for the Mission Bay EIR. Field work consisted of investigation of building conditions and development activity, as well as interviews with businesses, developers and realtors active in the area. Another source of information on land use and employment in this Nearby Area is the Potrero District Economic Development Inventory. The inventory results and background data are presented in the "Potrero District Economic Development Inventory (Second Interim Report)."

/23/ Port Commission of the City and County of San Francisco, "Official Statement Relating to $42,500,000 Port Commission of San Francisco Revenue Bonds, Series C," pp. 11-14, November 16, 1984.

/24/ The Port of San Francisco handles container, break-bulk and bulk cargo. Container cargo is increasing as a share of the total. The major commodities handled by containers include imports such as coffee (San Francisco's major container import), hardware, meat, data processing machinery, and textiles; and exports such as waste paper, metal scrap and cotton. As more commodities are containerized, break-bulk trade is declining. Nevertheless, San Francisco's largest import commodity (in terms of tonnage) is newsprint which, along with automobiles, still is a break-bulk cargo. Bulk cargo commodities handled by the Port include coconut oil, petroleum, cottonseed oil, tallow, grains, and fishmeal. See Port of San Francisco, "San Francisco - A Port That Is 'On A Roll'," Wharfside, September/October 1985.

/25/ The source for most information in this section is fieldwork conducted in early 1986 by Recht Hausrath & Associates for the Mission Bay EIR. An informal survey of business operations on and near piers east of China Basin Street was supplemented by lists compiled by the Port of San Francisco of tenants on the piers and seawall lots.

/26/ Louise Anderson, Traffic Analyst, Port of San Francisco, telephone conversation, November 19, 1986.

/27/ Jobs are characterized by occupational type as well as by wage and salary category. The classification of jobs by occupation is based on the Standard Occupational Classification system used by the U.S. Census. The eight major categories used in this analysis are presented below with examples to describe the types of jobs classified by each group. (Note that this classification is different from business activities and the Standard Industrial Classifications used to describe employment in preceding sections. The distribution of jobs among occupational categories is another way to describe employment and the characteristics of workers.)

- Professional or technical worker: accountant, architect, computer specialist, writer, lawyer, social worker, performing artist, or medical personnel;

- Manager or administrator: bank officer or financial manager, buyer or shipper, or any type of office, personnel or sales manager;

- Clerical worker: bank teller, counter clerk, bookkeeper, administrative assistant, vehicle dispatcher, receptionist or secretary, typist or keypunch operator;

- Skilled crafts worker: carpenter, printer, electrician, mechanic, automobile or boat repair worker;

- Operative worker: machine operator, crane operator, truck or bus driver, clothing presser, or dressmaker;

- Sales worker: sales clerk, real estate agent or broker, or insurance, stocks or bond seller;

- Service worker: cleaner, janitor, waiter or waitress, cook, police or detective, security guard; and

- Other: laborers, not elsewhere classified, such as construction laborer, freight mover, packer, stock handler, vehicle washer or equipment cleaner, or warehouse worker (other than clerical).

/28/ The surveys of C-3 District and South of Market employment indicate that the tendency of downtown jobs to employ San Francisco residents partly reflects the high propensity of hotel and retail businesses to employ local residents. It also reflects the fact that more than half of downtown office jobs (representing about three-fourths of all downtown employment) are held by City residents. Although similar surveys have not been done outside the downtown area, the higher proportion of workers in those areas who live outside of San Francisco appears to reflect a large number from San Mateo County, which is close to many places of employment in southern parts of the City. It also may reflect the higher propensity of jobs in industrial/distribution/manufacturing businesses to draw labor from outside the City. Surveys of those types of employers in the South of Market area and the

Mission Bay Project Area indicate higher-than-average percentages of employees residing outside San Francisco (with relatively high percentages from San Mateo County).

/29/ More information on the counties of residence for persons employed in the Downtown & Vicinity is provided in VI.C. Housing and Population, p. VI.C.29, in the subsection addressing residence patterns of workers in the Downtown & Vicinity.

/30/ Recht Hausrath & Associates, California Department of Finance (DOF), and California Employment Development Department, Annual Planning Information: San Francisco City and County, May 1986.

/31/ California Employment Development Department, Annual Planning Information, May 1986, (for each county).

/32/ McGuire, Chester C., "San Francisco Labor Pool Analysis," prepared for San Franciscans for Reasonable Growth, December 1985, pp. 19-29.

/33/ U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review, "The Employment Situation During 1986: Job Gains Continue, Unemployment Dips," February 1987, Vol. 11, No. 2, pp. 4-10.

FUTURE CONTEXT

/34/ San Francisco Department of City Planning, Downtown Plan Environmental Impact Report, EE81.3, certified October 18, 1984.

/35/ No attempt is made to predict future recessionary and expansionary periods or construction booms and busts. That would be extremely difficult to do accurately. Long-term forecasts assume that such cycles continue to occur and that, over time, cyclical ups and downs average out to a long-term trend.

/36/ The forecasts are not developed by adding the amount of space in Mission Bay to a list of projects already approved or under review and by estimating the amount of employment that would occupy that space (as would be done under a so-called "list-based" approach). The approach for this EIR takes the opposite perspective: that economic/employment growth generates demand for additional space, and that buildings per se do not generate economic growth.

/37/ The term "absorption" is commonly used within the context of real estate market analysis and development planning. The term refers to the process by which additional building space is leased and occupied by additional business activity and additional employment. Additional employment (not just construction of buildings) results in cumulative impacts on housing, transportation, energy and air quality. Absorption occurs when the net addition of space that new projects contribute to the overall total supply of space is absorbed by employment growth. Employment growth has not occurred until the space in new buildings is filled and any vacated space in older, existing buildings also is filled.

/38/ The residence patterns of future workers in the Downtown & Vicinity reflect the expected distribution of future labor force and employment within the region. Those are presented in VI.C. Housing and Population, pp. VI.C.55-VI.C.63. Background on the consideration of the growth of employment and of employed residents throughout the region is presented in Appendix C. Housing and Population, pp. XIV.C.16-XIV.C.19. More discussion of assumptions about the future supply of labor incorporated in employment forecasts is presented in Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.35-XIV.B.36.

/39/ With a hotel in Mission Bay under Alternative A, the 2000 hotel employment forecast for the Downtown & Vicinity excluding Mission Bay would be smaller than it is with Alternatives B and N, which do not include a hotel in Mission Bay. That is because the additional hotel employment in Mission Bay under Alternative A would occur in other parts of the Downtown & Vicinity with Alternatives B and N; the hotel employment forecast for the total Downtown & Vicinity including Mission Bay would be the same for all Alternatives.

/40/ Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.19-XIV.B.20, identifies the specific plans, policies and zoning that were assumed for the forecasts for the Downtown & Vicinity.

/41/ It is important to understand that the numbers describing the increase in occupied office space do not represent solely new construction of office space. The amount of new construction is less since a sizable share of the change in occupied office space is due to absorption of office space that was vacant in 1985. Some of the change also includes conversion to office of space formerly occupied by other uses. Tables in Appendix B. Land Use, Business Activity and Employment, identify the amount of additional office space (after accounting for absorption of existing, vacant space) included in the forecasts. Table XIV.B.13, p. XIV.B.39, Table XIV.B.14, p. XIV.B.40, and Table XIV.B.15, p. XIV.B.41, also relate the addition of office space to the annual limit on office development approvals under Proposition M.

/42/ Although changes in occupied space in Table VI.B.20 reflect changes in employment in Table VI.B.17, the two do not compare directly because of differences among uses in employment densities (amount of space occupied per employee). If the decline in space occupied by the category of "all other" uses seems large relative to the change in employment for those uses, that is because activities that are declining are generally lower-density uses and those that are growing have higher-than-average densities.

/43/ A 5% vacancy for office space allows for mobility of tenants and the ongoing turnover that occurs over time. As explained in the beginning of this section, the long-term forecasts developed for purposes of this EIR represent the long-term average pattern and are not sensitive to building or business cycles. It is possible that the vacancy rate in 2000 could vary from the 5% average assumed here. If so, the total amount of space would be larger or smaller than totals shown in the forecasts.

/44/ In Projections '85, ABAG's forecast of total employment for the region in 2000 including San Francisco is somewhat lower (about 3,652,100 jobs).

/45/ For the longer-term analysis period, the change in occupied space (i.e. space absorbed by employment growth) is similar to the change in total space. This occurs because similar vacancies (5%) are assumed at the beginning (2000) and end (2020) of the forecast period. Thus, the forecasts for this time period do not reflect the absorption of existing, vacant space as is forecast for the earlier analysis period (1986-2000) when vacancies in 1985 were higher than average. Given uncertainties involved in estimating space for the long-term future, estimates of space by use for 2020 are not presented in the text. Order-of-magnitude estimates have been developed and are included as background in Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.32-XIV.B.34.

IMPACT

/46/ Comparison of the Alternatives in terms of Project Area employment and job opportunities is not the complete story of what each Alternative means in terms of employment citywide. The Nearby Areas and citywide and regional discussions point out that differences between Alternatives in citywide employment are less than the differences between Alternatives in Project Area employment. Consequently, the description of Project Area jobs and employment opportunities for the Alternatives should be reviewed in the context of the discussion of Nearby Areas and citywide implications. From the broader cumulative perspective, the Alternatives are not as different as they appear from the Project Area perspective.

/47/ Construction employment is measured in terms of person-years of construction labor, not number of workers. A person-year is equivalent to one construction worker's labor, full-time, for one year. Appendix B. Land Use, Business Activity and Employment, pp. XIV.B.43-XIV.B.48, describes the procedure and assumptions for estimating Project Area construction employment.

/48/ The estimate of job openings is derived from data on job tenure of downtown workers. Data from C-3 District Employer/Employee Surveys done in 1981 for the Downtown Plan EIR and from the South of Market/Folsom Employer/Employee Surveys done in 1982 indicate that 25.7% of the work force had worked for their present employer for one year or less. Assuming that the number of employed persons is approximately equal to the number of jobs, about 25.7% of the jobs had been filled within one year or less. That percentage is similar to national data from the U.S. Bureau of Labor Statistics that indicates for 1981, 27.7% of all workers had been on their jobs for one year or less and for 1983, the comparable percentage was 27.3%. The national data are from two reports: Horvath, Francis W., "Job Tenure of Workers in January 1981," in U.S. Department of Labor, Bureau of Labor Statistics, Special Labor Force Report, Job Tenure and Occupational Change, 1981. Bulletin 2162, January 1983; and Sehgal, Ellen, "Occupational Mobility and Job Tenure in 1983," Monthly Labor Review, October 1984.

The above referenced reports indicate that job tenure is linked to age and that younger workers have lower rates of job tenure than older workers. In the future, the aging of the labor force may result in higher rates of job tenure. If so, the percentage of the work force that changes jobs each year would be lower than indicated by recent data. For this EIR's consideration of job openings, it is estimated that about 25% of the work force will change jobs each year. That is a little lower than indicated by recent downtown survey data and lower than recent national data.

/49/ Nine of the 114 establishments in the Project Area in 1985 could be included in the group that has longer-term expectations for their operations in the Project Area: Kaiser Sand and Gravel, Diamond Building Materials, City Electric Supply, Figone Cold Storage, Zenith Distributing, Potter Electric, United Coffee, Esprit, and H&H Ship Service Company.

/50/ San Francisco Department of City Planning, "Container Terminal Options," Mission Bay, San Francisco, Special Study for Mission Bay, prepared by Moffatt and Nichol Engineers, September 1986.

/51/ "Backland" is a term used to identify the area of a container terminal facility used for cargo handling and storage. Backland is essentially the entire terminal area excluding the terminal "apron" or working area at the edge of each wharf.

/52/ "Container Terminal Options Mission Bay, San Francisco," pp. 16, 24-38.

/53/ "Container Terminal Options Mission Bay, San Francisco," p. 66.

/54/ Retail spending by Project Area residents would support retail activity in the Project Area, in other parts of the City and, to a lesser degree, outside the City. This discussion focuses on spending within the Project Area. Although the types of retail stores and eating and drinking places in the Project Area would have some effect on the amount of consumer spending there, a large amount of retail spending (for such items as apparel, home furnishings, automobiles, and entertainment) would occur in other parts of the City that already are established as major shopping areas. Further, Project Area residents would patronize eating and drinking places throughout the City in addition to those in the Project Area, no matter what is built there. It is estimated that about 19% to 25% of Project Area household retail spending could be captured in Mission Bay. The range reflects variation in the amount and types of retail establishments in the Project Area. Spending by Project Area residents in other parts of the City is considered in a later discussion of effects on other retail areas of the City outside of Mission Bay (see p. VI.B.118).

/55/ Estimates of Project Area retail space to be supported by Project Area residents and workers were developed using the methodology in the report, "Retail Demand, Mission Bay, San Francisco" published in September 1986 by the San Francisco Department of City Planning as one of a series of Special Studies for Mission Bay. The assumptions about retail spending patterns of residents and workers are those shown in Tables 2 and 4 of the "Retail Demand" report. Since the EIR Alternatives do not assume a specific retailing concept, a range was developed for the EIR using high- and low-end estimates for the four illustrative plans analyzed in the special study. See: San Francisco Department of City Planning, "Retail Demand, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Recht Hausrath & Associates, September 1986, pp. 8, 12-15, and 31.

/56/ Some large convenience retailing operations have developed smaller stores to conform to the configuration of retail space along neighborhood commercial streets. Stores such as those could locate along Alternative A's neighborhood shopping streets, in which case Mission Bay residents would have access to the price and selection advantages available through large retailing operations.

/57/ The conclusions in the text regarding the South of Market Plan are based on the South of Market Plan: Proposal for Citizen Review, June 1985. The amount of potential future office development in the South of Market area is likely to be smaller than the amount assumed in the analysis in this EIR. The Proposal for Citizen Review on which this analysis is based permitted office development in the Service-Secondary Office (SSO) district covering portions of 12 blocks along Second Street and Townsend Street. The Proposal for Adoption is likely to propose an SSO district about half the size of that contemplated in the Proposal for Citizen Review. The area eliminated from the SSO district would instead be proposed for inclusion in the adjacent Service-Light Industrial (SLI) district in which office would not be permitted. (Susana Montana, San Francisco Department of City Planning, April 7, 1988.)

Mission Bay development under Alternative A, with all of the Project Area office blocks located north of the channel, would conflict with the goals of the South of Market Plan if it is amended as anticipated. Adjacent office development would not be compatible with the relatively low level of business activity that the amended plan expects to maintain along Townsend Street. There would be pressure to convert existing space on the north side of Townsend Street to activities that could take advantage of proximity to Mission Bay office businesses and the office worker population (e.g., retail shops and restaurants, small offices that cannot afford space in new buildings). Although office activities would not be allowed throughout most of the South of Market under the amended Plan, there would continue to be pressure to convert space to office uses (without permits) since office space, particularly that available at relatively low rents, would be limited.

/58/ With Alternative B, the anticipated amendments to the South of Market Plan along Townsend Street (see note 57, above) do not raise the land use compatibility issues raised with Alternative A. With adjacent residential development across Townsend Street in the Project Area, it would be easier to maintain a low level of activity in non-office businesses in the South of Market area. (Depending on the types of businesses located there, however, there might be other types of land use conflicts, from uses that are more industrial in nature that would make marketing housing in the Project Area more difficult.) On the other hand, since Alternative B itself would result in relatively more pressure on non-office uses South of Market compared to Alternative A; that, in combination with the Plan as amended, would result in even more pressure to accommodate small office businesses in existing buildings in areas designated for service and light industrial activity. Consequently, there could be more small office businesses locating in space converted without permits in the western South of Market and more non-office (service and light industrial) businesses having difficulty finding affordable space in that area.

/59/ The office block in the Project Area under Alternative N would conflict with the anticipated amendments to the South of Market Plan limiting the area allowed for office development along the north side of Townsend Street.

/60/ Future activity in the Inner Mission will be influenced by development related to Showplace Square as well as by factors affecting other older industrial areas such as those south of Mission Bay. Therefore, the Inner Mission area is included in the discussion of implications of the Alternatives for Nearby Areas west of the Project Area and for those south of the Project Area.

C. HOUSING AND POPULATION

SETTING

This section describes housing and population for the Mission Bay Project Area, the Downtown & Vicinity, San Francisco, and the rest of the Bay Area region. The discussion begins with the "big picture" and proceeds to focus on details of smaller geographic areas. Three kinds of information are presented: housing market data, demographic data describing population and households, and information illustrating the relationship between jobs and housing in San Francisco.

There are five main topics. First, housing market conditions in San Francisco and the Bay Area as a whole are described, including discussion of trends in housing production in the City. The second major section, focusing on the City and region, describes San Francisco's population, how it has changed over time, and how it relates to Bay Area population and housing. The third section focuses on population and housing in the Downtown & Vicinity, with particular attention to the existing residential community in the Mission Bay Project Area. The fourth section describes population, housing and demographic characteristics of residential neighborhoods near the Project Area. The last section describes the relationship between San Francisco residents who work and employment in the City. This section also focuses on the Downtown & Vicinity: where the workers live and where the residents work.

HOUSING MARKET CONDITIONS IN SAN FRANCISCO AND THE REGION

Regional Housing Market Context

Most housing market conditions in San Francisco reflect those that also occur in the Bay Area region. San Francisco and Bay Area housing is among the most expensive in the United States. The region offers a wide range of housing types and a range of housing prices and rents. For a given size and quality of housing, however, the price or rent is substantially higher in the Bay Area than in most other parts of the country.

The relatively high cost of housing in the Bay Area is attributable to a combination of demand and supply factors. Demand for housing is strong. The Bay Area is perceived as a desirable place to live for many reasons: climate, environment (open space and recreational opportunities), cultural amenities, strength and diversity of the economy, job opportunities, image, and quality and style of living. The Bay Area's prominent educational institutions and its traditional position as a port-of-entry for foreign immigrants (particularly from Asia) are other factors which contribute to the strong demand for housing in the region. On the supply side, there are constraining factors which also add to the relatively high cost of Bay Area housing. These include the scarcity and high cost of land for residential development in many communities as well as impact fees, which have been used increasingly to offset the public cost of new residential development. Growth limitation policies and other restrictions on residential development have constrained supply by limiting the land available for development and the amount of residential development that can occur.

In San Francisco and much of the rest of the Bay Area, these particular demand and supply factors have accentuated housing market conditions attributable to trends nationwide. In general, demographic and personal-choice factors have contributed to strong overall demand for housing. The baby-boom generation (usually defined as those born between 1946 and the early 1960s) has attained the age when people form their own households. The large size of this group in and of itself creates a strong demand for housing. At the same time, living arrangements have changed in ways that also increase demand for housing: more people are staying single longer and households split by divorce are more common.

Throughout much of the 1970s and early 1980s, housing supply did not keep pace with demand. Steep increases in housing prices combined with the scarcity and cost of mortgage financing posed the problem of the affordability of housing relative to household incomes. Therefore, in spite of strong demand, it was not feasible to produce new housing at prices and rents affordable to large segments of the housing market.

This situation moderated somewhat in the mid-1980s, a period marked by a substantial increase in the number of units added to the region's housing supply, and a shift to producing relatively more multi-family housing than in the past. Such factors, together with the decline in mortgage interest rates in recent years, have helped to improve the housing affordability equation for first-time homebuyers and new entrants to the region's housing market. The situation for renters also has improved. With lower mortgage interest rates, more renters have been able to purchase homes, thus reducing demand and the consequent pressure to increase rents. There also has been an increase in production of new rental housing. (See Appendix C. Housing and Population, pp. XIV.C.1-XIV.C.2, for more background detail.)

In summary, recent changes in the financing and development of both owner and rental housing have somewhat eased the housing market situation in the Bay Area. Overall housing production in the Bay Area has increased, in response to strong demand, stimulated somewhat by mortgage revenue bond financings and other subsidies to increase housing affordability and thus to expand the market for new housing. As a consequence, however, of continued strong demand (for the variety of reasons noted at the beginning of this section), Bay Area housing prices and rents are likely to remain among the highest in the nation.

Housing Affordability

Housing affordability refers to the relationship between housing costs (prices/rents and other costs) and household incomes. Affordability is a function of the variety of types of demand and supply factors noted above. As a result of these factors, many households have had to adapt to changing market conditions over the last decade and now allocate a greater share of their financial resources to housing. Many people cannot afford the housing they prefer and many are not housed at the standard that, until recently, they had come to expect. For example, many households accept smaller units, more people, fewer rooms, or different neighborhoods than they would like. The problem of housing affordability means that households that would otherwise be actively in the housing market (either as first-time homebuyers or as part of the move-up market) remain in their current housing situation because they cannot afford what is available. While problems of housing affordability can be traced to generally applicable housing market conditions of the late 1970s / early 1980s, the problem is most pronounced in areas of strong housing demand, such as the Bay Area region.

Within the region's housing market, moderate- and lower-income households have the most difficulty with housing choice and affordability. A limited supply of affordable new housing results in pressure to upgrade existing units and increased demand for rental units. Older housing and rental housing have been the primary housing options for those without resources to afford new housing. Increased demand and higher prices/rents for this segment of housing stock constrains even further housing conditions and choices for those moderate- and lower-income households traditionally limited to this segment of the market.

Housing Market Conditions in San Francisco

Overview

San Francisco's housing market reflects the extremes of some of the regional demand and supply factors. The demand for housing in the City is strong. As the central city and the most urban place in the region, San Francisco attracts both young households without children and older "empty-nester" households. As a major employment center, the City attracts those who want to live close to where they work. San Francisco's large gay community has contributed to strong housing demand, as has the City's immigrant community. New housing to relieve the market pressure created by strong demand is particularly difficult to provide in San Francisco because of high costs of production. Geographic constraints mean the amount of land available is limited and land costs are relatively high. There is relatively little vacant land remaining in San Francisco. Construction costs for the higher density development that does occur in the City are high. These development factors all point to the relatively high level of prices and rents required to make new residential development in the City feasible. Because high prices/rents are beyond what many households can afford, new housing to satisfy the demand of large segments of the market is not produced in San Francisco.

Housing Market Indicators

During the 1970s, there was a net addition of about 6,200 housing units in San Francisco, at an average rate of 620 units per year. The pattern has changed dramatically, since almost as many units were added in the five years from 1980 to 1985. There was a net addition of about 6,100 units in that period, resulting in an average rate of about 1,200 units added per year. Table XIV.C.1, p. XIV.C.2, shows the net addition of housing in the City during the 1970s and early 1980s.

The improved situation in the early 1980s largely reflects construction of many new units with the assistance of the San Francisco Redevelopment Agency or with subsidies from other public sources. (The continued availability of such assistance in the future is uncertain.) Land cost write-downs, non-profit development sponsors, and the sale of mortgage revenue bonds to provide low-interest-rate financing have been the primary stimuli to producing and marketing more affordable housing in San Francisco.

Low vacancy rates for housing in San Francisco reflect the low growth of the housing stock relative to demand. According to data from the Federal Home Loan Bank Housing Vacancy Surveys, the vacancy rate in San Francisco has been under 1% from the late 1970s through the early 1980s. The most recent data for 1986 show an overall vacancy of 1.1% for all housing types. San Francisco's housing vacancy rate remains the lowest among the nine Bay Area counties./1/

San Francisco's housing stock is primarily renter-occupied. According to the 1980 Census, one-third of the City's housing was owner-occupied and two-thirds renter-occupied. Among Bay Area counties, San Francisco has the largest percentage of rental units. As a consequence of strong demand and limited increase in supply, residential rents have increased considerably in the City; Census data indicate that median contract rent more than doubled from 1970 to 1980./2,3/ That rate of increase was almost twice the rate of growth in household income over this period. In the early 1980s, rents increased at a faster rate than in the 1970s, but by 1985/1986, rents in San Francisco as well as in the rest of the Bay Area had stabilized. San Francisco continues to be the region's most expensive rental market, with median advertised rents for two-bedroom unfurnished apartments ranging from $850 per month (January and April 1987) to $900 per month (April and October 1986), according to the Bay Area Council quarterly survey of advertised rents. After years of steady increase, advertised rent levels have remained stable since 1985 and have even declined somewhat. Increased production of rental units as well as a decline in demand from renters becoming homebuyers are two key factors responsible for this changing pattern./4/

Notwithstanding its expensive rental market, San Francisco's large stock of rental housing also offers units across a wide range of rent levels. Although the City has some of the most expensive rental housing in the region, it also has some of the lowest-rent housing. The latter includes a relatively large stock of small rental units in older buildings that provides one of the few sources of housing for lower-income households.

For-sale housing in San Francisco ranks among the most expensive in the region as a consequence of the desirability of certain City neighborhoods and the demand and supply factors mentioned above. Over the past decade, housing price increases in the City followed a pattern similar to that of the rest of the region and to that of other prime housing markets throughout the country. Overall interest rate factors, trends in home mortgage finance and income tax considerations contribute to the level of housing prices as do more localized demand and supply factors. In San Francisco, market trend data based on appraisals indicate that single-family housing values increased at a compound growth rate of 8.5% per year in the early 1970s and at a compound growth rate of 23% per year from 1975 to 1980. From 1980 through 1985, the rate of appreciation slowed to about 4% per year. In 1986, however, the data show a 15% increase in value, the largest annual increase in five years. A large part of this fluctuation may reflect the decline in home mortgage interest rates. The current housing market in the City is strong, with high levels of sales activity./5/

Pressures on the Existing Housing Stock

Because of constraints on new housing production, the difficulties in producing affordable housing in the City, strong demand, and preferences for older housing, San Francisco's existing housing stock has increasingly become the object of substantial upgrading. Many who cannot afford higher-priced neighborhoods or new housing look to other areas where older housing can be secured at lower prices. The additional cost to upgrade such housing is generally a sound investment in neighborhoods where demand is strong. As investment in older housing catches on, the desirability of an area increases, prices and rents rise, and many of the long-term residents of the neighborhood (e.g., lower-income households, older people, families, particularly those who have been renting) are eventually replaced by newcomers. San Francisco, with its plentiful stock of older housing and attractive neighborhoods, has been particularly susceptible to this process of neighborhood change, often referred to as "gentrification." Moreover, in recent years, increasing appreciation of urban neighborhoods and older housing and an increase in the number of households with such preferences combined with overall market conditions to support this type of upgrading. The process changes the demographic character of the neighborhoods and reduces the City's supply of housing in the lower price/rent ranges.

POPULATION AND DEMOGRAPHICS: CITYWIDE AND REGIONAL CONTEXT

San Francisco

San Francisco's population has undergone a dramatic change in recent years. After two decades of decline, total population in the City has increased since 1980. The City's population declined by 61,342 from 1960 to 1980, with most of the decline occurring in the 1970s. Since 1980, however, the California Department of Finance (DOF) estimates that

San Francisco made up that 20-year loss in five years. Total population in the City in 1985 is estimated to be about the same as it was in 1960. Table VI.C.1 shows basic population data for the City for 1970, 1980 and 1985.

The character of the City's population also has been changing. The net changes in total population mask changes in the composition of the whole as households mature and people move into and out of the City. The other information on Table VI.C.1 highlights some of these important characteristics.

While total population declined through 1980, the number of households in the City increased, as did the number of residents of the City who were employed. The increase in households reflects a general demographic trend of this period: baby-boom generation households tended to be smaller as people stayed single longer and postponed having children. These types of households tended to prefer the City over the suburbs. The pattern may have been accentuated in San Francisco because of the gay population in the City. The increase in employed population from 1970 to 1980 also is largely explained by the baby-boom; this large segment of the population entered the labor force in the 1970s. The increasing rate of labor force participation among women was also a contributing factor, as was the strong growth of employment opportunities in the City.

As a consequence of these patterns, two factors often used to gauge population characteristics showed different tendencies during the 1970s. Persons-per-household declined (i.e., household sizes were smaller on average in 1980 than in 1970). Meanwhile, workers-per-household increased (i.e., there were more workers in each household on average in 1980 than in 1970).

The period from 1980 to 1985 exhibits continuation of some of these patterns and marked changes in others. Population increased, according to sources used by the DOF (housing data, residential utility customer reports, school enrollment data, drivers license address change files, auto registration, and voter registration information)./6/ The employed population also has increased. Consequently, persons-per-household has returned to about the level of 1970 and workers-per-household has continued to increase.

The 1980-1985 data also reflect an interesting pattern in terms of the City's housing stock. The increase in households in the City (about 11,000) has outpaced the net addition of housing units (about 6,000) by almost a factor of two. This is explained by a substantial decrease in the number of vacant units; occupancy of units that were vacant in 1980

TABLE VI.C.1: SAN FRANCISCO POPULATION, EMPLOYED POPULATION, HOUSEHOLDS, AND HOUSING UNITS, 1970, 1980 AND 1985

	1970/a/	1980/b/	1985	1970-1980	1980-1985
Population	715,674	678,974	741,568 /c/	-36,700	+62,594
Population in Households/d/	690,921	654,511	716,209 /c/	-36,410	+61,698
Employed Population	318,311	342,484	372,050 /e/	+24,173	+29,566
Households	295,265	298,956	310,041 /c/	+3,691	+11,085
Housing Units	310,402	316,608	322,706 /c/	+6,206	+6,098
Persons per Household/f/	2.34	2.19	2.31		
Employed Persons per Household	1.08	1.15	1.20		

/a/ U.S. Department of Commerce, 1970 Census of Population and Housing: Census Tracts, San Francisco-Oakland SMSA, Tables P-1, P-3, and H-1.

/b/ U.S. Department of Commerce, 1980 Census of Population and Housing: Census Tracts, San Francisco-Oakland SMSA, Tables P-1, P-10, and H-1.

/c/ California Department of Finance, Population and Housing Estimates for California Cities and Counties, for January 1, 1986, Summary Report E-5.

/d/ Consistent with definitions used by the U.S. Bureau of the Census, population in households includes all persons occupying housing units. People living in group quarters are counted separately. Total population is the sum of population in households and population in group quarters.

/e/ Recht Hausrath & Associates estimate using Department of Finance household estimate and estimate of workers per household developed by RHA (which is the same as the Association of Bay Area Governments' estimate of workers per household in San Francisco from Projections '85).

/f/ Calculated using population in households, which excludes population in group quarters. This is consistent with the Bureau of the Census measure of persons per household, calculated (as in the table above) by dividing the population in households by the number of households.

SOURCE: Recht Hausrath & Associates

contributed as much to household growth as the net addition of housing units in the City. (In 1980, the Census recorded about 18,000 vacant housing units in the City; by 1985, the DOF estimated that number to have declined by about 6,000, to 12,000 vacant units.)/7/

Rest of Region

San Francisco was alone among the nine Bay Area counties in experiencing population decline during the 1970s. Population in the rest of the region grew by 15% from 1970 to 1980. The rest of the region's population continues to increase in the 1980s. Table XIV.C.2, p. XIV.C.3, shows population and household data for the rest of the region in 1970, 1980 and 1985.

Generally, population and household growth have been occurring in less densely developed parts of the region where land is available and housing development costs are lower. The pattern of population and household growth also reflects, in part, suburban preferences of some households as well as job opportunities.

The overall demographic trends discussed above for San Francisco also apply to the region. During the 1970s, average household size in the region overall declined substantially, and employed population increased by a larger amount and at a faster rate than did population as a whole. The average number of workers per household increased.

San Francisco in the Regional Context

In 1980 and 1985, about 13% of the region's population lived in San Francisco. About 20% of total regional employment was located in the City as of 1985. Generally, population is more dispersed throughout the region than is employment. That reflects the common pattern of metropolitan growth in which suburban residential development expands the bounds of the region while most employment remains concentrated in more densely developed business centers served by highways and public transportation.

Table VI.C.2 presents data from the 1980 Census comparing the characteristics of San Francisco's population and households to characteristics for the rest of the region. In most instances, San Francisco stands out distinctly from the regional pattern. It should be noted, however, that the characteristics for San Francisco are also those generally attributable to urban centers. San Francisco has a larger proportion of elderly and a

TABLE VI.C.2: COMPARISON OF DEMOGRAPHIC CHARACTERISTICS FOR SAN FRANCISCO AND THE REST OF THE REGION, 1980

	San Francisco (Percent)	Rest of Region (Percent)
Age Distribution		
Less than 16	14.8	23.3
16-64	69.9	67.2
65 and Over	15.3	9.5
TOTAL	100.0%	100.0%
Race/Ethnicity		
White	58.2	77.8
Black	12.7	8.5
American Indian, Eskimo and Aleut	0.5	0.6
Asian and Pacific Islander	21.7	6.7
Other	6.9	6.4
TOTAL	100.0%	100.0%
Spanish origin/a/	12.3%	12.2%
Household Type		
Family	47.0	68.9
Non-Family	53.0	31.1
TOTAL	100.0%	100.0%
Tenure of Occupied Housing Units		
Owner-Occupied	33.7	59.8
Renter-Occupied	66.3	40.2
TOTAL	100.0%	100.0%

/a/ Persons of Spanish origin may be of any race.

SOURCE: U.S. Department of Commerce, 1980 Census of Population and Housing: Census Tracts, San Francisco-Oakland SMSA, Vallejo-Fairfield-Napa SMSA, Santa Rosa SMSA, and San Jose SMSA, Tables P-1, P-7, and H-1.

smaller proportion of children than does the rest of the region, The proportion of the population in labor force years (approximately ages 16-64) is about the same, however. The marked contrast in household types is consistent with the difference in the age distribution. Less than one-half of San Francisco's households are family households, compared to more than two-thirds family households in the rest of the region./8/ This comparison is consistent with the center city's traditional role as a residence for smaller households with workers and the elderly who need lower-cost housing near transit and other services. Families with children need larger houses and tend to choose predominantly residential neighborhoods less densely developed than are typically found in San Francisco.

San Francisco's population is more racially mixed than is the population overall for the rest of the region. More than half the City's population is white compared to more than three-quarters of the rest of the region's population. San Francisco's population has a higher proportion of Asians than does the region's overall (three times as high); the proportion of blacks in the City also is higher, but the difference compared to the rest of the region is not as great. The proportions of populations claiming Spanish origin are almost identical.

The urban character of San Francisco compared to the rest of the region also is evident in characteristics of housing stock. The City's rental housing stock is large; most (66%) housing is renter-occupied. The pattern is almost the opposite for the rest of the region, where almost 60% of housing is owner-occupied.

POPULATION AND HOUSING: DOWNTOWN & VICINITY AND THE PROJECT AREA

Population and Households in the Downtown & Vicinity/9/

Table VI.C.3 presents population and household data for 1980 and estimates for 1985 for the Downtown & Vicinity and compares the Downtown & Vicinity to citywide totals. In a citywide context, the role of the Downtown & Vicinity as a residential area has been secondary to its role as an employment center. While employment in the Downtown & Vicinity accounts for 58% of total employment in the City, population in the Downtown & Vicinity is only 6% of the total City population. The Downtown & Vicinity does fulfill some special functions as a residential area and is the location of much newly constructed and proposed housing in the City.

In 1985, it was estimated that about 46,000 people lived in the Downtown & Vicinity. The population has increased since 1980, as has total City population. The rate of population growth has been faster in the Downtown & Vicinity than in the rest of the City, primarily

TABLE VI.C.3: COMPARISON OF POPULATION, EMPLOYED POPULATION, HOUSEHOLDS, AND HOUSING UNITS IN THE DOWNTOWN & VICINITY TO CITYWIDE TOTALS, 1980 AND 1985

	1980/a/			1985		
	Downtown & Vicinity	Total City	Downtown & Vicinity as Percent of Total	Downtown & Vicinity/b/	Total City	Downtown & Vicinity as Percent of Total
Population	40,511	678,974	6.0%	46,330	741,568 /c/	6.2%
Population in Households	33,633	654,511	5.1%	39,205	716,209 /c/	5.5%
Employed Population	16,605	342,484	4.8%	19,220	372,050 /d/	5.2%
Households	22,426	298,956	7.5%	24,720	310,041 /c/	8.0%
Housing Units	25,491	316,608	8.1%	25,640	322,706 /c/	7.9%
Persons per Household/e/	1.50	2.19		1.59	2.31	
Employed Persons per Household	0.74	1.15		0.78	1.20	

NOTE: For purposes of summarizing population and household data, the area referred to as the Downtown & Vicinity is defined to include the following Census tracts: 105, 114-118, 121, 123-125, 162, 176.01, 178, 179.01, 180, and the Mission Bay Project Area residents in tract 607. The small population outside of the Project Area but in Census tract 607 has been excluded from the totals for the Downtown & Vicinity.

/a/ U.S. Department of Commerce, 1980 Census of Population and Housing: Census Tracts, San Francisco-Oakland SMSA, Tables P-1, P-10 and H-1.

/b/ Derived by Recht Hausrath & Associates based on data from several sources, including: San Francisco Department of City Planning, Housing Information Series: Changes in the San Francisco Housing Inventory, reports for 1980, 1981-1982, 1983-1984, and 1985; California Department of Finance, Population and Housing Estimates for California Cities and Counties, for January 1, 1986, Summary Report E-5; and Federal Home Loan Bank of San Francisco, Housing Vacancy Survey: San Francisco County; Survey Date, September 1985; Publication Date, February 1986.

/c/ California Department of Finance, Population and Housing Estimates for California Cities and Counties, for January 1, 1986, Summary Report E-5.

/d/ Recht Hausrath & Associates estimate using Department of Finance household estimate and estimate of workers per household developed by RHA (which is the same as the Association of Bay Area Governments' estimate of workers per household in San Francisco from Projections '85).

/e/ Calculated using population in households, which excludes population in group quarters.

SOURCE: Recht Hausrath & Associates

because many of the immigrants who account for a large part of population growth in the City have settled in low-cost housing in the area. The share of the total City population living in the Downtown & Vicinity has increased.

Compared to the share of total population, a smaller share of the City's employed population lives in the Downtown & Vicinity. That reflects another aspect of the special role of the Downtown & Vicinity as a residential area. It is home to a relatively large number of San Francisco's elderly who need low-cost housing and access to transit and other services. Those aspects of downtown living also attract San Francisco's transient, unemployed population.

In 1985, about 25,000 households lived in the Downtown & Vicinity. That represented 8% of total City households. There are proportionally more households than population, reflecting smaller-than-average household sizes in the Downtown & Vicinity. Average household size in the area is about 1.6 persons, while there are 2.3 persons per household on average for the City as a whole./10/ Household size is a function of the size of housing units, which generally are smaller in this oldest and most-densely-developed of San Francisco's residential areas.

The employed-persons-per-household factor for the Downtown & Vicinity also is lower than the factor for the City. On average, there is less than one worker per household in the Downtown & Vicinity. This means that there are many households with one worker as well as households with no workers. This is consistent with the profile of the Downtown & Vicinity as home to many single-person households, a large share of the City's elderly who are beyond their working years, and the unemployed, disabled, and others needing public assistance.

Table VI.C.4 presents a comparison of the demographic characteristics of the residents of the Downtown & Vicinity with all City residents. The characteristics shown here are the same as those used to compare San Francisco with the rest of the region. The population in the Downtown & Vicinity is a more extreme version of patterns that differentiate the center city from suburban parts of the region. Data show the Downtown & Vicinity with proportionally more elderly and fewer children than the City overall. Together, minority groups make up about half the population in the Downtown & Vicinity, a larger percentage than in the City overall. The difference is due primarily to the large Asian population downtown. Asians represent 32% of the population in the Downtown & Vicinity (compared to 22% citywide) and 66% of the minority (i.e., non-white) population. Only 20% of

TABLE VI.C.4: COMPARISON OF DEMOGRAPHIC CHARACTERISTICS FOR THE DOWNTOWN & VICINITY AND THE TOTAL CITY, 1980

	Downtown & Vicinity (Percent)	Total City (Percent)
Age Distribution		
Less than 16	8.0	14.8
16-64	70.3	69.9
65 and Over	21.7	15.3
TOTAL	100.0%	100.0%
Race/Ethnicity		
White	51.6	58.2
Black	9.8	12.7
American Indian, Eskimo, and Aleut	1.6	0.5
Asian and Pacific Islander	32.0	21.7
Other	5.0	6.9
TOTAL	100.0%	100.0%
Spanish origin/a/	8.1%	12.3%
Household Type		
Family	20.1	47.0
Non-Family	79.9	53.0
TOTAL	100.0%	100.0%
Tenure of Occupied Housing Units		
Owner-Occupied	2.3	33.7
Renter-Occupied	97.7	66.3
TOTAL	100.0%	100.0%

/a/ Persons of Spanish origin may be of any race.

SOURCE: U.S. Department of Commerce, 1980 Census of Population and Housing: Census Tracts, San Francisco-Oakland SMSA, Tables P-1, P-7, and H-1.

households in the Downtown & Vicinity are family households compared to an almost 50/50 split citywide. Finally, almost all of the housing is rental units. By contrast, the rest of the City, though still predominantly a place of renter-households, has other neighborhoods where owner-occupied, single-family homes are the norm.

The area referred to as the Downtown & Vicinity consists of several different residential areas. The Mission Bay Project Area residential community is part of the Downtown & Vicinity. In 1985, the 34 residents of the houseboat community on China Basin Channel represented less than one-tenth of one percent of the total population in the Downtown & Vicinity. The following subsection describes characteristics of the Project Area population in detail. The South of Market residential neighborhood also is part of, and represents about one-quarter of the total population in, the Downtown & Vicinity. The South of Market area is discussed in more detail in the Nearby Areas section, p. VI.C.17. As mentioned above, the Downtown & Vicinity provides older housing stock serving the needs of immigrants, elderly, the unemployed, and others seeking low-cost housing and access to public services. Much of that housing is located in Chinatown, the Tenderloin and parts of the Civic Center area as well as in South of Market. Newer housing development along the Embarcadero and in the Northeast Waterfront has attracted higher-income households to downtown.

Since the late 1960s, a relatively large amount of housing has been built downtown in high-density complexes such as Golden Gateway, 101 Lombard, Telegraph Landing, Opera Plaza, Fox Plaza, and St. Francis Place. Many residents of this newer downtown housing are employed, and most work within the Downtown & Vicinity. (The pattern is described in more detail in the section dealing with the Jobs/Housing Relationship, p. VI.C.31.) That characteristic of the population of the Downtown & Vicinity is likely to become a more important factor in the future as many of the larger-scale additions of housing in the City are planned for the Downtown & Vicinity (e.g., Rincon Hill, Rincon Point-South Beach, Yerba Buena Center, and Mission Bay).

Mission Bay Project Area/11/

The Project Area is generally not considered a residential area. The primary residential community within the Project Area is the houseboat community on China Basin Channel. Although the houseboat community is the only "official" residential use, there are a few others living within the Project Area. The San Francisco Recreational Vehicle Park and open land under and around the I-280 freeway ramps have been used to park vehicles that serve as minimal-cost housing.

Nineteen of the 20 houseboats in the channel were occupied in early 1986. The total population in the houseboat community was 34 people. Seventeen houseboats were occupied by their owners; the others were rented. The average number of persons per household was 1.8 in early 1986. There are a few families with children. Household incomes cover a broad range and are fairly evenly spread across income levels. In early 1986, about the same proportion of households had annual incomes (in 1985 dollars) of less than $12,000 as had incomes of $50,000 and over. In general, household incomes are higher than in the surrounding neighborhoods. Census data indicate that median incomes in 1979 for households in the Project Area were higher than the citywide median.

Most of the houseboat population are employed. On average there were 1.2 workers per household in early 1986. The residents who do not work are primarily retirees or children. Most of the employed residents of the houseboat community work in San Francisco, although there is considerable variation in place-of-work.

Houseboat and pleasure-craft berths have been located in China Basin Channel since 1960, when the State of California relocated the boating community from the Islais Creek Basin and established permanent berths at the China Basin Channel./12/

POPULATION AND HOUSING: NEARBY AREAS

Overview

The residential neighborhoods near the Project Area are among the oldest residential areas in San Francisco. Their development dates from the early days of settlement around Market Street and the waterfront and to the subsequent expansion of heavy industrial enterprises and worker housing along the bayshore to the south.

The residential areas in the southeastern part of the City are distinctive because of their location near downtown and older industrial areas of the City. The land use pattern is more mixed than it is in predominantly residential areas that make up western parts of the City. The mix of uses in addition to changing development patterns related to both downtown growth and other business activity trends in the City affects the characteristics of these residential areas. They represent a racially and ethnically diverse population; they have a higher-than-average share of the City's lower-income households; and the older housing stock in these neighborhoods includes some of the lowest-cost housing in the City.

For the discussion of population and housing, the EIR focuses on three Nearby Areas that border the Project Area: South of Market, Potrero Hill and Lower Potrero / Central Bayfront. In 1980, the population of these areas was about 19,000, less than 3% of the total City population./13/ In addition, the Inner Mission and South Bayshore residential areas are discussed. The Inner Mission and South Bayshore are relatively larger neighborhoods, with populations of about 50,200 and 21,600 respectively, in 1980. Together, all five areas represent 13% of the total City population. See Figure IV.2, p. IV.6, for a map of the Nearby Areas. Appendix C. Housing and Population, pp. XIV.C.7-XIV.C.11, presents the population and housing data on which the following descriptions are based./14/

South of Market

Overview

In terms of population and households, the South of Market area is the largest of the three residential areas bordering the Mission Bay Project Area. The population is diverse, consisting of a large number of elderly, single people, Southeast Asian and Filipino immigrants and other minorities, as well as a number of artists living and working in industrial loft studios.

The South of Market area is part of the Downtown & Vicinity. The residential neighborhoods within the South of Market area co-exist with a mix of non-residential uses. Much of the older housing is small-scale, clustered on mid-block alleyways and above ground-floor commercial uses in the western parts of South of Market. Older, higher-density housing exists in mostly dilapidated apartments and residential hotels along Sixth Street. To the east, new high-density apartments have been developed as part of the Yerba Buena Center Redevelopment Program.

Population

The South of Market area was home to about 10,000 people in 1980. About 2,000 people (20% of the total area population) live in group quarters. (That includes primarily inmates of the Hall of Justice as well as residents of rooming and boarding houses and some types of housing for the elderly.) While the area's population declined from 1970 to 1980 (at about the same rate as the citywide decline in population), it is likely that the population has remained fairly constant or has increased somewhat since 1980. That is consistent with citywide trends, considering the role of South of Market in housing recent immigrants, and with occupancy of Yerba Buena Center over that period.

White residents are a minority in South of Market. The racial and ethnic composition of the population is different from that of other Nearby Areas. Asian and Pacific Islanders (particularly Filipinos) account for nearly one-third of the population, a substantially larger share of the total than in other Nearby Areas. Blacks represent 15% of the population, a relatively smaller share than in other close-in areas.

South of Market is notable for its large proportion of elderly residents. As in other parts of the Downtown & Vicinity (i.e., north of Market Street), the elderly find low-cost housing in old residential hotels and apartment buildings. There also are several elderly-housing complexes in the Yerba Buena Center Redevelopment Area. Almost one in five persons living in the South of Market is age 65 or over.

Not counting the large proportion of the population in group quarters, the rest of the South of Market population live in small households (1.6 persons per household, compared to 2.2 persons per household citywide in 1980). Households in other Nearby Areas are larger, on average, than those in the South of Market. The small household size reflects the large proportion of single residents (about three-quarters of the total households), many of whom are elderly, and the relatively small number of children and families living in this area. Compared to other Nearby Areas and to the total City, the proportion of family households in South of Market is small (about 20% compared to 47% citywide).

South of Market is predominantly a lower-income community, with relatively high unemployment, low rates of labor force participation, and a high proportion of the population living on pensions or other fixed incomes. According to the 1980 Census, one-quarter of all South of Market households had incomes below the poverty level in 1979.

Among other Nearby Areas, only the Lower Potrero / Central Bayfront had as high a poverty rate for households. The relatively high proportion of low-income households can be attributed partially to the smaller average household size which means, on average, fewer wage-earners living in a household.

South of Market households are generally the least well-off among neighborhoods near Mission Bay. Only about half the residents over age 25 have graduated from high school, compared to 75% of all City residents. Labor force participation among the working age population is relatively low (55% compared to 71% citywide), and among those in the labor force, unemployment is relatively high. Of the South of Market residents who work, most hold jobs at the lower-end of the wage scale, in clerical, service, crafts, operative, and other-laborer occupations.

Housing Stock

South of Market housing stock is virtually all rental housing. Almost 98% of all occupied units are renter-occupied. The neighborhood's housing consists primarily of studio and one-bedroom apartments, and units in single-room-occupancy (SRO) residential hotels. Between 1970 and 1980, there was a net loss of housing in the South of Market area, while the other nearby residential areas showed net gains in housing. From the 1980 Census through 1985 there was a small net addition of housing in the South of Market. In 1986, St. Francis Place (410 rental units) became available for occupancy, representing a change from past trends and an indication of the future pattern for housing in this part of downtown.

The Department of City Planning has proposed new zoning through the South of Market Plan to preserve and expand the lower-cost residential areas west of Fourth Street, in the face of pressures for downtown office and retail expansion. The South of Market also has been the focus of plans and projects for substantial new housing that would change the residential character of the area east of Fifth Street: new elderly and rental units built as part of the Yerba Buena Redevelopment Area; a new residential neighborhood in the Rincon Point / South Beach Redevelopment Area; and new mixed-use development in the Rincon Hill Plan area (see VI.A. Public Plans, Policies and Permits, p. VI.A.6). As a consequence of these plans and policies, substantial gains in South of Market housing stock are expected in the future, compared to the area's loss of housing in the past.

Potrero Hill

Overview

The Potrero Hill neighborhood is located south and west of the Project Area, separated from Mission Bay by Showplace Square and the industrially zoned areas at the foot of the hill (North Potrero). The northern slope of Potrero Hill consists predominantly of older, single-family houses and flats with a few larger, more modern apartments and condominium complexes. Eighteenth Street is the neighborhood's retail center, with a mix of small shops and restaurants. There is a smaller node of retail activity along 20th Street. The Potrero Terrace and Potrero Annex public housing projects (over 600 units built in 1949 and 1955, respectively) are located on the southeastern slope of Potrero Hill. The City-sponsored 120-unit Parkview Heights housing development, containing a mix of market-rate and subsidized units, was recently completed further to the west on the southern slope of the hill.

Population

In 1980, there were about 8,500 people living in about 3,800 households in the Potrero Hill area. Since 1980, the population probably has increased with the addition of housing in the area. This pattern reverses a trend of the 1970s, when Potrero Hill lost population; the decline of about 8% was greater than the rate of population decline citywide during that period. At the same time, however, there was an increase in households, implying not only the loss of population but a change in the types of households in the area. Average household size declined from 2.67 in 1970 to 2.26 in 1980, a 15% decrease. Although the trend towards smaller household sizes applied citywide, the change was not as dramatic as in the Potrero Hill neighborhood.

Compared to other residential neighborhoods near Mission Bay, Potrero Hill does not have as great a racial mix. In 1980, more than 60% of the population was white; blacks are the other major population group, representing about 24% of the total neighborhood population in 1980.

In general, Potrero Hill's households are similar in type to the overall City pattern. Almost half are family households. This contrasts with other close-in Nearby Areas that have relatively low percentages of family households. Potrero Hill's family households are different from the citywide average in that they include proportionally more children and female-headed households. Of the non-family households, the percentage living alone is lower than in the other Nearby Areas or citywide, suggesting that relatively more of Potrero Hill households consist of singles sharing housing.

Income data for Potrero Hill reflect distinctions between a concentration of households in public housing and other neighborhood households. Overall, median household income in 1979 was about $15,000 (1979 dollars), almost exactly the citywide median. Compared to the citywide average, however, proportionally more households fell below the poverty level, although the share of households below the poverty level (16%) was less than in the other nearby residential areas.

The characteristics of the Potrero Hill labor force are similar to citywide patterns. Labor force participation is high, and proportionally more of those in the labor force are employed than in other Nearby Areas. The distribution of employed residents by occupation follows the citywide pattern very closely. The proportion of professional/technical and managerial/administrative workers is high relative to other nearby neighborhoods. Potrero Hill has a lower percentage working in service, crafts, operative, and other-laborer occupations.

Housing Stock

Potrero Hill is distinguished from other residential neighborhoods adjacent to Mission Bay by a high degree of home-ownership. Slightly more than one-third of occupied units are owner-occupied, similar to the citywide average but substantially different from the owner-renter split in other nearby neighborhoods. Potrero Hill's housing stock increased between 1970 and 1980, with a large part of the increase in owner-occupied units, many being in new condominium developments. Since the 1980 Census, there has been a steady addition of housing in the neighborhood, the most prominent addition being the Parkview Heights development on the southern slope.

While new housing has been built, existing Potrero Hill housing, particularly on the northern and western slopes, has become more desirable. Much of the housing is older single-family structures or flats. The close-in location, views, and quality and price of the housing and of the neighborhood have attracted younger people, artists, and, increasingly, downtown-worker households in recent years. Census data as of 1980 indicate that a somewhat higher percentage of Potrero Hill households had moved within the past year, compared to the citywide pattern, though the trend is not as dramatic as in Lower Potrero / Central Bayfront.

Lower Potrero / Central Bayfront

Overview

Lower Potrero / Central Bayfront adjoins the Project Area to the south. The neighborhood here is the smallest of nearby residential areas, with about 500 residents living in about 240 households as of 1980. Between 1970 and 1980, there was a net loss of about 100 people in the neighborhood, by far the largest percentage decline among nearby residential areas. Since 1980, the population probably has remained fairly stable, with some small increase possible.

Housing in the Lower Potrero / Central Bayfront consists of older residential buildings among industrial, distribution and commercial sales and service businesses south of the Project Area. The neighborhood lies to the west of Third Street, although there is some housing above ground floor retail and commercial uses along Third Street. The area is separated from the larger Potrero Hill neighborhood by Interstate 280. Most housing clusters along Tennessee and Minnesota Streets at 22nd Street and at 18th Street. The Department of City Planning's 1976 Architectural Inventory identified the distinctive row houses in that neighborhood as structures of architectural merit.

Population

Lower Potrero / Central Bayfront is not as racially diverse as the City as a whole or as South of Market. As in the Potrero Hill neighborhood, the population consists predominantly of white and black residents. Lower Potrero / Central Bayfront is distinguished by a relatively high proportion of black residents (40% of the total). White residents make up about half of the population. There are very few Asians or Hispanics.

The mix of household types in Lower Potrero / Central Bayfront is about 40% family households and 60% non-family households. That is a lower proportion of families than in the City overall but not as extreme as in South of Market. Of non-family households, proportionally fewer than in South of Market are single-person households. That is attributable partly to differences in types of housing: residential hotels and apartments in South of Market compared to older houses and flats in Lower Potrero / Central Bayfront.

Income data for this neighborhood indicate a greater income mix than in other Nearby Areas. Lower Potrero / Central Bayfront contains a relatively high percentage of households at lower ends of the income scale, a relatively low percentage in the middle range, and a relatively high percentage at the upper end of the range. More than half of Lower Potrero / Central Bayfront households had incomes greater than the citywide median income of $15,000 in 1979. The proportion in this group is higher than the overall average distribution for the City. In fact, this is the only nearby residential neighborhood with a median household income somewhat higher than the citywide median. The income distribution is similar to that for Potrero Hill, but is in marked contrast to that for South of Market, where only 19% of the households had incomes greater than $15,000 in 1979. Nevertheless, a relatively high percentage of the Lower Potrero / Central Bayfront neighborhood is not well off. About 23% of the population was classified below the poverty level in the 1980 Census.

Household income is markedly different for owner and renter households in Lower Potrero / Central Bayfront. Although this is generally true throughout the City, the gap appears to be wider here. Median household income for owner-households in 1979 was about $26,000 (1979 dollars), while median income for renter-households was about $10,000 (1979 dollars). All of the households living below the poverty level were renter households.

Lower Potrero / Central Bayfront is also distinctive for the labor force characteristics of its residents. A relatively large percentage of the working age population is in the labor force; however, the unemployment rate among area residents is relatively high. It is also interesting to note that less than half (48%) of the area's residents aged 25 and older have graduated from high school, a similar percentage to that in South of Market. Citywide and on Potrero Hill, about 75% have high-school diplomas. Many of the employed residents work in industrial occupations: 40% are in crafts, operative, and other-laborer occupations, a far higher percentage than in other Nearby Areas or the City as a whole. The workforce is not solely of that type, however. About 10% are in professional/technical occupations and 25% in clerical occupations.

Housing Stock

In 1980, there were 265 housing units in the Lower Potrero / Central Bayfront area. The neighborhood consists primarily of older, wood-frame housing. In general, most of San Francisco's housing stock is old (more than 60% was built in 1939 or earlier); in Lower Potrero / Central Bayfront, however, a substantially larger share (85%) was built that long ago. Much of the housing dates from the early decades of the City's development, when heavy industrial activity commenced south of Mission Bay. Many workmen in iron and gas works and refineries lived in boarding houses and hotels nearby, in a neighborhood known as Irish Hill. After 1930, much of the neighborhood was demolished to accommodate ship repair expansion in World War II, and more recently as a consequence of I-280 construction./15,16/

Since 1980, the housing stock has remained fairly constant, with a small net loss of units reported in City statistics. The condition of the remaining housing is mixed. It appears that there have been some recent rehabilitation efforts; many buildings have attractive San Francisco Victorian features. Census data on tenure indicate that the upgrading may be related to new investment in owner-occupied housing. As of 1980, about 40% of the owner-households had moved into their current unit within the last year; citywide only 8% of owner-households had moved as recently. In contrast, renter-households were longer-term residents of the neighborhood: 43% of renter-households in 1980 had moved into their current unit in 1969 or earlier. Only 15% of renters citywide had lived in the same rental unit for as long. Information on changes in the housing stock, in combination with Census data on household incomes in the area, indicates that the residential enclave in the Lower Potrero area has been experiencing gentrification to some degree.

More-Distant Residential Areas

Inner Mission

The Inner Mission is the largest residential neighborhood near the Project Area. In 1980, the population was about 50,000. In the 1970s, the neighborhood experienced a relatively small population decline. The Inner Mission has a strong neighborhood identity as the center for the City's Hispanic community. In 1980, almost half of the residents claimed some form of Spanish origin. The Asian and Filipino population is growing in the area, and blacks are a relatively small proportion of the total.

In general, Inner Mission households are larger than the citywide average and households in other Nearby Areas. As in the Potrero Hill neighborhood, almost half the households are family households and a relatively large proportion of the residents (20%) are children 16 years old or younger.

As in other nearby neighborhoods, the households and population in the Inner Mission are generally less well-off than households citywide. Slightly less than 20% of households had incomes below the poverty level in 1979. While the poverty rate for families is lower than in South of Market or Potrero Hill neighborhoods, the poverty rate for non-family households is relatively high.

Inner Mission housing stock is notable for its age. There has been relatively little new development; almost 70% of the housing stock is more than 40 years old. Most of the units are rental housing (85% of occupied units in 1980).

The residential sections of the Inner Mission area are separated from Mission Bay by development patterns and physical barriers. Potrero Hill and the U.S. 101 freeway form a fairly distinct boundary between the bayshore neighborhoods and the more western residential areas. In addition, the industrial district in the northeast corner of the Inner Mission (near Showplace Square and the Potrero industrial areas) further sets off the residential areas to the west. In fact, the continuation of major downtown streets through the Inner Mission (Mission, South Van Ness / Howard, Folsom, Harrison, Bryant) provide a stronger connection between this residential area and downtown activity than exists in neighborhoods closer to Mission Bay.

South Bayshore

The residential neighborhoods of the South Bayshore area begin about two miles south of the Mission Bay Project Area, south of Islais Creek and the Port facilities and industrial areas inland of India Basin. The area includes large public housing projects and newer residential development sponsored by the San Francisco Redevelopment Agency in Hunters Point, as well as primarily single-family housing on either side of Third Street as it nears Candlestick Park. This section of Third Street, once an active neighborhood commercial street, is now in a period of decline, with numerous vacancies and boarded-up storefronts.

In 1980, there were about 22,000 residents in South Bayshore. Between 1970 and 1980, the population declined. The area has the largest concentration of black residents in the City. In 1980, almost three-quarters of the residents were black. Whites made up 15% of the population and Asians, 8%.

South Bayshore residential areas also are distinguished by the high proportion of family households and by the rate of home-ownership. Families represent 75% of all households compared to 47% citywide. The percentage of family households is substantially higher here than in other Nearby Areas. The large average household size (3.0 persons per household) reflects the predominance of families with children. The South Bayshore area has the highest percentage of children under 16 years of age among all Nearby Areas. Almost 60% of the housing is owner-occupied, compared to one-third owner-occupancy citywide. None of the other nearby residential neighborhoods demonstrate the same degree of home-ownership.

In terms of income status, the South Bayshore population appears about the same as other nearby neighborhoods, all of which rank as lower-income communities within the City. Overall, about 20% of all South Bayshore households had incomes below the poverty level, a lower proportion than in South of Market and Lower Potrero / Central Bayfront, but a higher proportion than in the Potrero Hill neighborhood.

Compared to other Nearby Areas and the City as a whole, South Bayshore has a housing stock of relatively recent construction. Other residential areas in the eastern part of the City were developed earlier; South Bayshore development as a residential area occurred about the time of World War II. In 1980, only about one-third of the housing stock dated from 1939 or earlier.

Recent years have seen additions to the housing stock in this part of the City after many years of decline. Part of the 1970-1980 decline in population can be traced to the loss of about 1,500 housing units over that period. Since 1980, almost 500 units have been added as a result of Redevelopment Agency activity. The new units include single-family homes, a 300-unit multi-family cooperative, and single-family townhouses. This activity is part of the Redevelopment Agency's overall program for Hunters Point that includes construction of about 1,600 housing units, 77% of which are to be subsidized for low-and-moderate income households. As of January 1, 1987, all of the low-to-moderate housing and about 50% of the market-rate units had been completed./17/

JOBS/HOUSING RELATIONSHIP

This section focuses on the relationship between jobs and housing and provides information to describe: (1) the general relationship between jobs and housing in San Francisco; (2) places of residence throughout the region for those persons employed in jobs in the Downtown & Vicinity; and (3) places of work for those residing in the Downtown & Vicinity. This information is useful in analyzing the housing market implications of additional jobs and additional housing in the Downtown & Vicinity. It provides a way of relating jobs in the Downtown & Vicinity to the labor force and housing market in San Francisco and counties outside of the City. Information on places of residence (for employees) and places of work (for residents) also contributes to the transportation analysis by identifying directions of commute travel for those working and living in the Downtown & Vicinity.

Overall Relationship Between Jobs and Housing in San Francisco

Jobs and Employed Residents

The overall relationship between jobs and housing in San Francisco can be seen by comparing the number of jobs in the City to the number of employed residents (those residing in the City's housing who work). The number of jobs in San Francisco is larger than the number of employed residents, about one and one-half times larger as shown in Table VI.C.5. That reflects San Francisco's historic role as the center city of a large region in which most of the land area is outside the city's boundaries. The City depends on the rest of the region to house a part of its labor force and the rest of the region depends on the City for jobs.

The ratio of jobs to employed residents has changed over time. Through 1980/81, employment in San Francisco had been growing by a larger amount than the City's employed population so that the ratio of jobs to employed residents had been increasing (1.3:1 in 1960, 1.5:1 in 1970, 1.7:1 in 1980/81). Since 1981, employment has not grown, although the number of employed residents increased. Thus, the ratio of jobs to employed residents declined, returning to a ratio similar to that in 1970. The strong growth of population and decline in employment between 1981 and 1985 are not typical of long-term trends.

Residents Working in San Francisco Compared to All Employed City Residents

The number of City residents who work in San Francisco has continued to increase through 1985. They represent a large percentage of all City residents who work (about 82% in 1985 as shown in Table VI.C.5). This percentage has declined over time, most likely reflecting the large growth of jobs in other counties of the region, which increases the probability that some San Francisco residents find jobs outside the City. This pattern is also influenced by the increase in workers per household, which increases the likelihood that some workers commute to jobs outside the City.

Residents Working in San Francisco Compared to City Jobs

City residents who work in San Francisco hold slightly more than half of the City's jobs (about 52% in 1985, as shown in Table VI.C.5). The percentage of jobs

TABLE VI.C.5: SAN FRANCISCO JOBS AND EMPLOYED RESIDENTS, 1970, 1981, AND 1985

	Total			Change	
	1970/a/	1981/b/	1985/b/	1970-1981	1981-1985
Jobs	494,129	589,300	584,900	+95,171	-4,400
Employed Residents	318,311	345,360	372,050	+27,049	+26,690
Ratio of Jobs to Employed Residents/c/	1.55:1	1.71:1	1.57:1		
Residents Working in San Francisco	283,615	295,630	305,820	+12,015	+10,190
Employed Residents: Percent Working in San Francisco/d/	89.1%	85.6%	82.2%		
Jobs: Percent Held by City Residents/e/	57.4%	50.2%	52.3%		

NOTE: This table includes 1981 rather than 1980 because estimates for both jobs and employed residents are available for 1981 (the detailed employment analysis and surveys done for the Downtown Plan EIR were done for 1981, not 1980). The pattern shown for 1981 is similar to that which existed in 1980.

/a/ The 1970 estimates of total employed residents and residents working in San Francisco are from the 1970 Census. The 1970 employment figure is from U.S. Department of Commerce, *County Business Patterns, 1970, California*. This employment estimate may not be entirely consistent with the 1981 and 1985 figures, which are from a different source.

/b/ The 1981 and 1985 estimates are those developed by Recht Hausrath & Associates (RHA) for this EIR. The employment figures for both years are from the California Employment Development Department (EDD) and have been adjusted by RHA to include self-employed persons and to reflect annual average employment for each year. The 1981 estimates of total employed residents and of residents working in San Francisco are derived from 1980 Census data. The 1985 estimates of total employed residents and of residents working in San Francisco are updates based on 1985 employment figures and on 1985 estimates of population and households in San Francisco prepared by the California Department of Finance (DOF).

/c/ The ratios are derived by dividing the number of San Francisco jobs by the number of employed residents. Although the employment estimate for 1970 may not be entirely consistent with those for 1981 and 1985, the pattern of increase in this ratio from 1970 to 1981 is accurate even if the actual amount of the change was slightly different than shown.

/d/ The percentages are derived by dividing the number of City residents working in San Francisco by the total number of employed residents in the City.

/e/ The percentages are derived by dividing the number of City residents working in San Francisco by the number of San Francisco jobs.

SOURCE: Recht Hausrath & Associates

held by residents declined through 1980/81, reflecting the fact that the labor force residing in the City did not grow as much as employment, while population and labor force in areas outside of San Francisco grew by much larger amounts than in the City. Between 1981 and 1985, the percentage of City jobs held by City residents increased as the employed population continued to grow while employment declined.

Residence Patterns of Workers in the Downtown & Vicinity

This subsection focuses on the Downtown & Vicinity (including Mission Bay). It presents information about the places of residence of all persons employed in jobs in the Downtown & Vicinity, including San Francisco residents and those residents of other counties in the region. This is relevant to the relationship between jobs and housing in the City and the rest of the region. This information also contributes to the transportation analysis by identifying directions of travel for those commuting to and from work in the Downtown & Vicinity.

Residence Patterns Among Counties of the Region

Table VI.C.6 summarizes the residence patterns of workers in the Downtown & Vicinity among counties of the region./18/ As shown, the majority of workers, 57.6% as of 1985, live in San Francisco. The next largest numbers live in Alameda, San Mateo, Contra Costa, and Marin Counties, in that order. Together, these four counties surrounding San Francisco house about 40% of the people working in the Downtown & Vicinity. The remaining 2.5% reside in more peripheral counties of the region: Solano, Napa, Sonoma, and Santa Clara Counties. Only a very few workers live outside the nine-county Bay Area region.

When workers in the Downtown & Vicinity are grouped by commute corridors outside of San Francisco, about 24% live in the East Bay, about 12% in the South Bay, and about 7% in the North Bay.

The percentage of employed residents of each county represented by those who work in the Downtown & Vicinity also is identified in Table VI.C.6. The percentages relate jobs in the Downtown & Vicinity to the labor force and housing market in San Francisco and counties outside of the City. The table shows that slightly more than half of the employed residents of San Francisco work in the Downtown & Vicinity./19/ In the rest of the region, about 6% of the employed residents work in the Downtown & Vicinity. People

TABLE VI.C.6: RESIDENCE PATTERNS OF WORKERS IN THE DOWNTOWN & VICINITY, 1981 AND 1985

	Number of People Working in the Downtown & Vicinity Who Reside in Each Place/a/		Percent of Total Jobs in the Downtown & Vicinity		Percent of Total Employed Residents of Each Place/b/	
Place of Residence	1981	1985	1981	1985	1981	1985
San Francisco	199,080	196,790	55.2	57.6	55.8	52.9
East Bay	86,100	80,720	24.9	23.5	9.0%	7.3%
Alameda	44,930	41,990	13.0	12.3	8.7%	.2%
Contra Costa	37,330	34,710	10.8	10.2	12.2%	9.9%
Napa/Solano	3,840	3,570	1.1	1.0	2.9%	2.1%
South Bay	43,870	41,300	12.6	12.1	4.5%	3.8%
San Mateo	40,960	38,620	11.8	11.3	13.1%	11.6%
Santa Clara	2,910	2,680	0.8	0.8	0.4%	0.4%
North Bay	24,870	23,210	7.2	6.8	10.1%	8.2%
Marin	22,120	20,670	6.4	6.1	18.9%	16.4%
Sonoma	2,750	2,540	0.8	0.7	2.1%	1.6%
Other	160	160	0.1	small	--	--
TOTAL	346,080	341,730	100.0%	100.0%	13.7%	12.0%

NOTE: This table presents estimates for both 1981 and 1985 for two reasons. One is that the 1981 estimates provide the starting point or setting for much of the housing and population analysis because Census data are available for 1980 and the C-3 District Employer/Employee Surveys were done in 1981. The other reason is that the change from 1981 to 1985 is not considered typical of long-term trends, so that providing information for both years offers a better basis for comparison when considering the forecasts and analyses for future years.

/a/ The residence patterns shown here were developed from data in the 1980 Census and from surveys done in the C-3 District in 1981, the South of Market in 1982, the Civic Center area in 1981, and the Project Area in 1985. See Appendix C. Housing and Population, pp. XIV.C.20 - XIV.C.21, for more explanation.

/b/ For 1981, the percentages compare the estimated number of people working in the Downtown & Vicinity and living in each county in 1981 with the total number of employed residents of each county in 1980 from the Census. The percentages shown are slightly high to the extent that the number of employed residents of each county was higher in 1981 than in 1980. For 1985, the estimates of the number of people working in the Downtown & Vicinity and living in each county are compared to the estimates of total employed residents in each county from two sources. The 1985 estimate of the number of employed residents in San Francisco is that developed for this EIR by RHA (see Table VI.C.1, p.VI.C.8). The estimates of 1985 employed residents for the other counties of the region are from ABAG, Projections '85.

SOURCE: Recht Hausrath & Associates

working in the Downtown & Vicinity represent the largest percentage of employed residents of Marin County (about 16% in 1985), followed by San Mateo (about 12%), Contra Costa (about 10%), and Alameda (about 7%) Counties. In peripheral counties, the percentages of employed residents working in the Downtown & Vicinity are very small (about 2% or less).

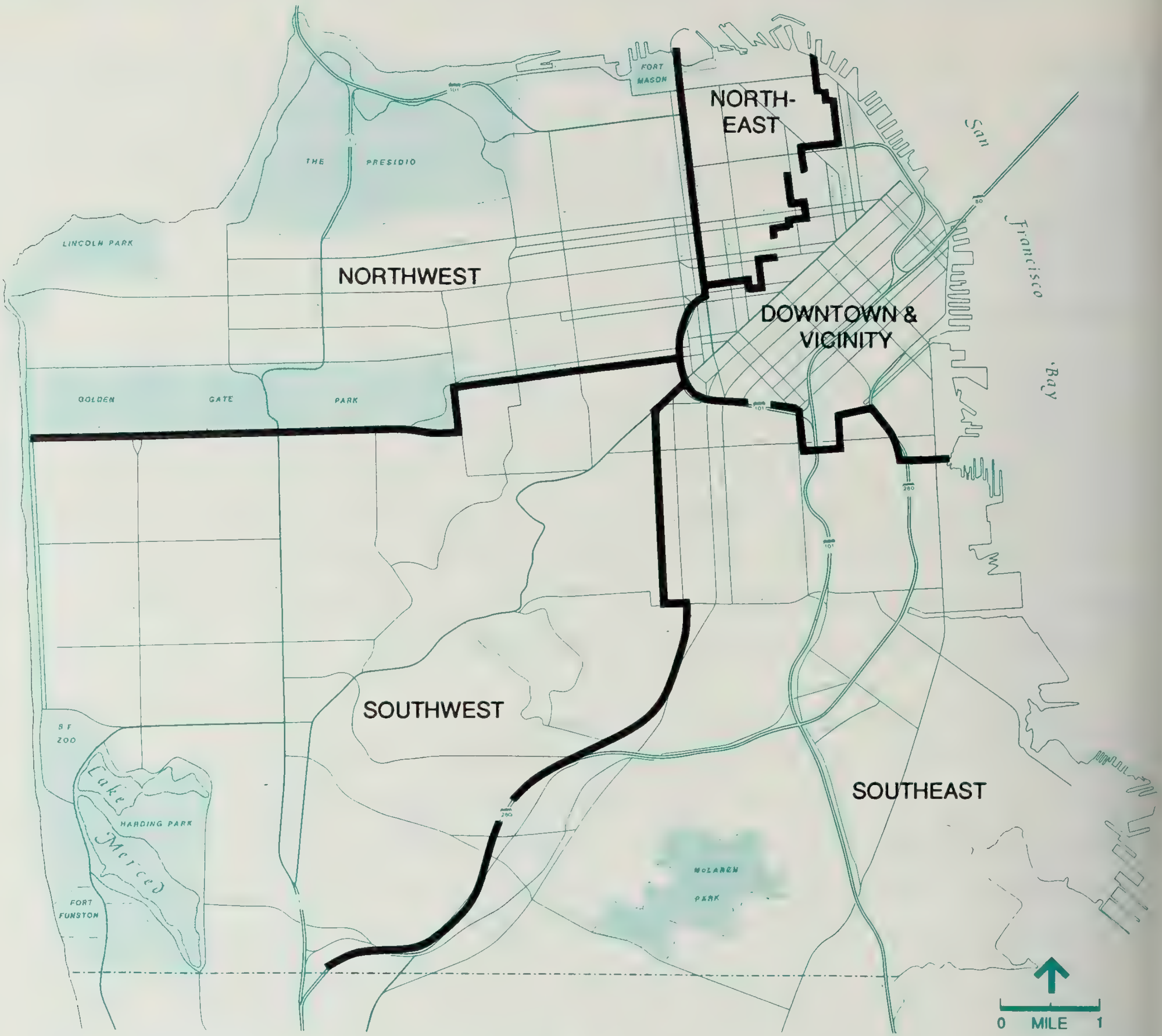
Residence Patterns Within San Francisco

As described above, more than half of the people working in the Downtown & Vicinity live in San Francisco, in neighborhoods throughout the City. When the estimates are divided among five major districts (see Figure VI.C.1), the largest number of those workers resides in the southwest and northwest districts of the City (see Table VI.C.7, p. VI.C.33). The next largest number resides in the southeast district, followed by the northeast district and the Downtown & Vicinity itself. The estimates indicate that in 1985 about 12,500 people both lived and worked in the Downtown & Vicinity.

Since there are differences in population between districts, comparisons of those who work in the Downtown & Vicinity to the total number of employed residents of each district are shown in Table VI.C.7, p. VI.C.33. These percentages show a variation in propensity (or likelihood) of residents in each area to work in the Downtown & Vicinity. The highest percentage of residents working in the Downtown & Vicinity exists for the Downtown & Vicinity itself (65% in 1985). The northeast district has the next highest percent followed by the northwest, southwest and southeast. The variations between districts reflect demographic characteristics of residents, types of housing available, proximity and accessibility to jobs in the Downtown & Vicinity, and proximity and accessibility to jobs in other parts of the City and region. Compared to the citywide average (52.9% of employed residents worked in the Downtown & Vicinity in 1985), those working in the Downtown & Vicinity represent higher-than-average percentages of the employed residents of the Downtown & Vicinity and the northeast and northwest districts, and lower-than-average percentages of employed residents in the southwest and southeast parts of the City.

Places of Work of Residents of the Downtown & Vicinity

This subsection focuses on residents of the Downtown & Vicinity and, specifically, their places of work. The information provides background for the relationship between


NORTH-
EAST
NORTHWEST
DOWNTOWN &
VICINITY
SOUTHWEST
SOUTHEAST
FORT MASON
THE PRESIDIO
LINCOLN PARK
GOLDEN GATE PARK
SF ZOO
Lake Merced
HARDING PARK
FORT FUNSTON
McLAREN PARK
San Francisco Bay
101
80
280
0 MILE 1

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE VI.C.1
SAN FRANCISCO
RESIDENTIAL DISTRICTS

TABLE VI.C.7: RESIDENCE PATTERNS WITHIN SAN FRANCISCO OF WORKERS IN THE DOWNTOWN & VICINITY, 1981 AND 1985

District of Residence Within San Francisco/a/	Number of People Working in the Downtown & Vicinity Who Reside in Each District/a/		Percent of Total Jobs in the Downtown & Vicinity		Percent of Total Employed Residents of Each District/b/	
	1981	1985	1981/c/	1985	1981/c/	1985
Downtown & Vicinity	11,230	12,500	3.3	3.7	67.6	65.0
Northeast	22,590	23,760	6.5	7.0	61.2	56.8
Northwest	50,630	51,700	14.6	15.1	58.7	55.3
Southwest	67,510	68,340	19.5	20.0	54.0	51.6
Southeast	39,120	40,490	11.3	11.8	50.9	48.0
TOTAL	191,080	196,790	55.2%	57.6%	55.8	52.9

NOTE: This table presents estimates for both 1981 and 1985 for two reasons. One is that the 1981 estimates provide the starting point or setting for much of the housing and population analysis because Census data are available for 1980 and the C-3 District Employer/Employee Surveys were done in 1981. The other reason is that the change from 1981 to 1985 is not considered typical of long-term trends, so that providing information for both years offers a better basis for comparison when considering the forecasts and analyses for future years.

/a/ See Figure VI.C.1, p.VI.C.32.

/b/ The residence patterns shown here were developed from data from the 1980 Census and from surveys done in the C-3 District in 1981, the South of Market in 1982, the Civic Center area in 1981, and the Project Area in 1985. See Appendix C. Housing and Population, pp. XIV.C.20-XIV.C.21, for more explanation.

/c/ For 1981, the percentages compare the estimated number of people working in the Downtown & Vicinity and living in each district of San Francisco in 1981 with the total number of employed residents of each district in 1980 from the Census. The percentages shown are slightly high to the extent that the number of employed residents in each district was higher in 1981 than in 1980. For 1985, the estimates of the number of people working in the Downtown & Vicinity and living in each district are compared to the estimates of total employed residents in each district developed by RHA based on citywide population and housing estimates for 1985 and information on the distribution within San Francisco of housing units added since 1980 and on changes since 1980 in housing vacancy among districts of the City.

SOURCE: Recht Hausrath & Associates

downtown housing/residents and downtown employment. It will be useful later when considering Mission Bay and other projects that may add housing as well as jobs to the Downtown & Vicinity. Information about places of work for residents of the Downtown & Vicinity also is relevant to the transportation analysis by identifying the directions of travel to and from work for those living in the downtown area.

Table VI.C.8 shows that about two-thirds of the employed residents of the Downtown & Vicinity also work in that area. The next largest number (about 22%) work in the rest of the City. The remainder (about 14%) work outside the City. The largest number of those commuting outward work in the South Bay, followed by those working in the East Bay. Small numbers of residents of the Downtown & Vicinity work in the North Bay and outside the region./20/

TABLE VI.C.8: PLACES OF WORK FOR EMPLOYED RESIDENTS OF THE DOWNTOWN & VICINITY, 1980-1981 AND 1985

	Number of Residents of the Downtown & Vicinity by Place of Work		Percent Distribution of Residents of the Downtown & Vicinity by Place of Work	
Place of Work	1980-1981	1985	1980-1981	1985
Downtown & Vicinity	11,230	12,500	67.6	65.0
Rest of San Francisco/a/	3,730	4,140	22.5	21.5
Northeast	975	1,080	5.9	5.6
Northwest	1,275	1,415	7.7	7.3
Southwest	640	710	3.8	3.7
Southeast	840	935	5.1	4.9
TOTAL SAN FRANCISCO	14,960	16,640	90.1	86.5
East Bay/b/	565	980	3.4	5.1
South Bay/c/	780	1,110	4.7	5.8
North Bay/d/	135	340	0.8	1.8
Other	165	150	1.0	0.8
TOTAL	16,605	19,220	100.0%	100.0%

NOTE: The places of work for residents of the Downtown & Vicinity were estimated based on the 1980 Census, the Downtown Residents Survey conducted in 1986 (see Appendix C. Housing and Population, pp. XIV.C.4-XIV.C.7, for a description of the survey), and data from the 1980 Metropolitan Transportation Commission trip tables summarized by Barton-Aschman Associates, Inc. for this EIR. The sources for the estimates of the number of employed residents in 1980-1981 and 1985 are presented in Table VI.C.3. p. VI.C.12.

/a/ See Figure VI.C.1, p. VI.C.32.
/b/ The East Bay includes Alameda, Contra Costa, Solano, and Napa Counties.
/c/ The South Bay includes San Mateo and Santa Clara Counties.
/d/ The North Bay includes Marin and Sonoma Counties.

SOURCE: Recht Hausrath & Associates

FUTURE CONTEXT

This section presents the future context for housing, population and labor force in the Downtown & Vicinity, the rest of the City, and the region. These are the scenarios of future growth and change in addition to that in the Project Area that are the subject of the cumulative impact analyses in this EIR. Chapter IV. Study Approach and Organization p. IV.3, describes the rationale for the cumulative impact analyses and, on pp. IV.7-IV.11, discusses the purposes of the cumulative growth scenarios used in this EIR.

Chapter V. The EIR Alternatives and Approval Process, pp. V.38-V.40, identifies future housing, population and employed population for each Alternative within the Project Area. This future context section identifies the companion scenarios for housing, population and employed population for areas outside the Project Area.

The future context scenarios are necessary because the Downtown & Vicinity, the rest of the City, and the region will grow and change over time and the Project Area Alternatives would have different effects on that growth and change, depending on the land uses accommodated in Mission Bay.

The following discussion identifies general trends reflected in the downtown, citywide and regional forecasts. Those generalized conditions are common to the future for areas outside the Project Area under all Mission Bay Alternatives. However, because the Mission Bay Alternatives would have impacts outside the Project Area, i.e., on growth and development in Nearby Areas, on total housing and population in the City and on the potential for people working in San Francisco also to live in the City, the future scenario associated with each Project Area Alternative is different.

Consequently, in this future context section, different sets of numbers are presented as the scenarios for the future under each Alternative, incorporating the different effects of each Mission Bay Alternative on future conditions outside the Project Area. Those differences are defined as the impacts of the Project Area Alternatives on the relationship between jobs and housing in the City and housing market conditions in Nearby Areas, the rest of the City, and the rest of the region and are described in the Impact section, beginning on p. VI.C.81.

There are two parts to the future context discussion. The first focuses on forecasts of housing, population and employed population, describing future housing production and demographic trends. The second part demonstrates how EIR employment forecasts and employed population (labor force) forecasts are linked. Text and tables in the second part of this section illustrate how citywide and regional jobs and housing compare in the future. The second part also presents cumulative scenarios on where people working in the Downtown & Vicinity live and where people living in the Downtown & Vicinity work.

Two time periods are discussed here: an analysis at build-out (2020) of Mission Bay Alternatives and an interim analysis at the year 2000. Chapter IV. Study Approach and Organization, pp. IV.7-IV.9, describe the rationale for and selection of the analysis years.

This future context section discusses housing, population and the relationship between job growth and labor force growth for the Downtown & Vicinity, the total City and the region as a whole. The future context for business activity and employment is presented in VI.B. Land Use, Business Activity and Employment, beginning on p. VI.B.53. Although described in a separate section, those employment forecasts were developed and are consistent with the forecasts for housing and population; each describes a different aspect of the same future context. Together, the two sets of forecasts provide background for analysis of local impacts associated with the Mission Bay Alternatives and identify the scenarios of growth in addition to Mission Bay analyzed in the cumulative impact assessments throughout the EIR.

METHODOLOGY AND UNDERLYING ASSUMPTIONS

The housing and population forecasts prepared for the EIR are based on analyses of demographic trends, factors affecting household size and labor force participation, potential for housing production in the City, and variables that influence characteristics of people living in San Francisco and the Bay Area region in the future. Background analyses included review of other forecasts. The analyses incorporated the best available data and information describing past, current and likely future conditions and trends regarding economic, demographic, real estate, and public-policy factors. Appendix C. Housing and Population, pp. XIV.C.14-XIV.C.19 and XIV.C.21-XIV.C.29, provides more information on the forecasting approach and methodology and identifies data sources.

The overall factors affecting housing market conditions in the nation and in the Bay Area are assumed to remain basically the same over the long term (see p. VI.C.1)./21/ National factors such as interest rates and tax law are not forecast specifically. Housing production will continue to recover from low levels of the early 1980s. The availability and cost of housing is unlikely to return to conditions of the 1970s, however. The cost of housing relative to incomes is assumed to remain relatively constant. Housing will remain more costly relative to incomes and to other goods and services than it was in the 1960s and 1970s. The problem of housing affordability described on p. VI.C.3 will persist.

Against that housing market background, the EIR analysis focuses on housing demand and supply factors in San Francisco. Each Mission Bay Alternative would result in a different cumulative scenario for housing demand and supply. How those scenarios would affect housing market conditions in the City and the region is identified in the Impact section, see pp. VI.C.81-VI.C.86 and VI.C.92-VI.C.97.

HOUSING AND POPULATION

2000

Citywide Context

Population and housing will continue to grow in San Francisco through the year 2000, although at a slower pace than in the 1980 to 1985 period (see Table VI.C.9). Long-term population growth in the City represents a reversal of the pattern of population decline from 1960 to 1980. Expected population growth is explained by continued strong demand for housing in the City, relatively high rates of housing production compared to the 1970s, and demographic and housing market factors affecting the way people group into households.

Housing Units and Households. As shown in Table VI.C.9, the net addition of housing units in the City from 1986 through 2000 is expected to range from 15,000 (with Alternative N) to 16,500 units (with Alternatives A and B). The underlying scenario for housing production in the City over that time period is for an annual average net addition of about 1,000 units per year plus about 1,500 units in total of additional military housing at Hunters Point./22/ That assumption results in the overall net addition of 16,500 units through 2000 for the scenarios for Alternatives A and B. The smaller amount forecast for

TABLE VI.C.9: SAN FRANCISCO HOUSING UNITS, HOUSEHOLDS, POPULATION, AND EMPLOYED POPULATION, 1985 AND 2000

		Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
	1985	2000	1986–2000	2000	1986–2000	2000	1986–2000
Downtown & Vicinity/a/							
Housing Units	25,640	34,730	+9,090	34,730	+9,090	32,080	+6,440
Households	24,720	33,560	+8,840	33,560	+8,840	30,910	+6,190
Population	46,330	62,650	+16,320	62,570	+16,240	57,420	+11,090
Employed Population	19,220	29,850	+10,630	29,850	+10,630	26,770	+7,550
Rest of City							
Housing Units	297,060	304,470	+7,410	304,470	+7,410	305,620	+8,560
Households	285,320	292,480	+7,160	292,480	+7,160	293,630	+8,310
Population	695,240	723,130	+27,890	723,210	+27,970	725,210	+29,970
Employed Population	352,830	376,730	+23,900	376,730	+23,900	378,000	+25,170
TOTAL CITY							
Housing Units	322,700	339,200	+16,500	339,200	+16,500	337,700	+15,000
Households	310,040	326,040	+16,000	326,040	+16,000	324,540	+14,500
Population	741,570	785,780	+44,210	785,780	+44,210	782,630	+41,060
Employed Population	372,050	406,580	+34,530	406,580	+34,530	404,770	+32,720

NOTE: The forecasts in the table were prepared for the cumulative analyses in the Mission Bay EIR. Appendix C. Housing and Population, pp. XIV.C.14-XIV.C.16, provides more information on the forecasting approach and methodology and identifies data sources.

/a/ The Downtown & Vicinity includes the Project Area.

SOURCE: Recht Hausrath & Associates

the City under the Alternative N scenario reflects the fact that no new housing would be developed in Mission Bay under that Alternative. While some of the difference would be compensated by more new housing in other parts of the Downtown & Vicinity and the rest of the City, not all of the difference would be made up that way. (Chapter VII. Variations on Alternatives, p. VII.1, discusses a housing variant of Alternative N.)

Most of the remaining development potential on major housing opportunity sites identified in the City's Residence Element (in Redevelopment Areas and selected mixed residential-commercial use areas) would be built out by 2000, although some of the potential housing identified in the Residence Element would take beyond the year 2000 to build and absorb. The scenario for the 1986-2000 period also includes some infill development on vacant residentially zoned land and residentially zoned land developed at less than allowable density. Infill development would be a relatively small part of total housing production, however.

The housing and household forecasts incorporate a housing vacancy assumption. The citywide housing vacancy rate is assumed to remain relatively constant over time (about 3.9%)./23/

Population. The increase in population in the City from 1986 through 2000 would range from about 41,000 (Alternative N) to 44,000 (Alternatives A and B) (see Table VI.C.9, p. VI.C.39). San Francisco's total population in 2000 would be over 780,000: the scenarios for Alternatives A and B would result in the same total population (about 786,000); the scenario for Alternative N would result in a lower total (about 783,000).

Growth in population reflects the addition of housing and households in the City, as well as changes in the characteristics of existing households. For the scenarios in the EIR, overall average household size of 2.3 persons-per-household is assumed to remain at about 1985 levels through 2000. That represents a change from the pattern of the 1970s (decrease in persons-per-household, see p. VI.C.7), accounts for the shifts in San Francisco population and demographics in the 1980s (increase in persons-per-household, see p. VI.C.7), but does not assume that short-term adjustment continues as a longer-term pattern.

The average incorporates several different factors. New housing in the City is likely to be smaller than much existing housing, thereby accommodating relatively smaller households. In general, the number of children in City households is likely to increase somewhat (following general demographic trends), contributing to larger average household sizes. On the other hand, the elderly population also will increase; since they tend to live in smaller households they contribute to smaller average household sizes. Foreign immigrants generally group into larger than average households. Housing market conditions (expected to remain somewhat similar to conditions in the mid-1980s) also contribute to larger household sizes as singles double-up and young adults live longer with their parents, for example.

The different factors have offsetting effects. Demographic and lifestyle changes influencing the decline in household size in the 1970s have stabilized. Long-term trends related to immigration are difficult to predict. Consequently, the EIR population scenarios distribute population growth among new housing and existing housing so that the average household size remains at about 1985 levels through 2000. The population forecast also incorporates an increase in persons residing in group quarters, primarily the elderly in congregate living facilities.

Employed Population. Employed population (residents of the City who work) is the most important variable for many of the EIR cumulative analyses. The employed population in San Francisco is expected to increase from 1986 through 2000 by 33,000 (with Alternative N) to 35,000 (with Alternatives A and B) (see Table VI.C.9, p. VI.C.39). The largest increase, associated with Alternatives A and B, would result in total employed population of about 407,000 in 2000; under the Alternative N scenario, total employed population in the City would be about 405,000 in 2000.

The number of people living in the City who work can increase with additions to the housing stock, and also through changes in the characteristics of people living in both new and existing housing. The 1970s are a good example of the importance of considering the characteristics of the population. From 1970 to 1980 in San Francisco, population declined while the number of residents who worked increased (see p. VI.C.7). In the future scenarios, both population and employed population are expected to increase. There will be relatively more workers in the population and more workers per household, on average.

The number of City residents in their working years is expected to increase through 2000. Labor force participation (the percentage of the population that is in the labor force, i.e., working or looking for work) also is expected to increase, though at a slower rate than in earlier years. Increases in labor force participation in San Francisco will come from some continued increase in the percentage of women working. In addition job growth will attract people into the labor force and attract households with workers to live in the City, as in the past.

Distribution of Housing and Population Within the City

There will be increases in housing and population throughout the City from 1986 through 2000 (see Table VI.C.9, p. VI.C.39). The most change will occur in the Downtown & Vicinity because of the large amount of new housing expected to be added there (in Rincon Point / South Beach, Rincon Hill, Yerba Buena Center, and in other smaller mixed-use and residential projects). With Alternatives A and B, new Mission Bay housing would supplement that overall change. With those Alternatives, housing added in the Downtown & Vicinity between 1986 and 2000 would account for 55% of total housing added in the City. With Alternative N, new housing in the Downtown & Vicinity would represent about 43% of housing added in the City.

With new housing, there will be increases in population and workers living downtown. From 1986 through 2000, the population in the Downtown & Vicinity would increase about 25-35%, and employed population (residents who work) would increase about 40-55% depending on the Alternative for Mission Bay. New housing and population in Mission Bay would not represent the majority of that increase, however. Of the total increase for the Downtown & Vicinity in housing units/households (about 9,000 from 1986 through 2000) and population (about 16,000 from 1986 through 2000), Mission Bay under Alternatives A and B would account for about 3,000 new housing units/households and 5,000 new residents. With Alternative N, with no new housing in Mission Bay, all of the increase in housing/households and population in the Downtown & Vicinity would be attributable to housing development outside the Project Area. By 2000, the share of total City population living in the Downtown & Vicinity would increase from the share in 1985.

As a consequence of the large amount of new housing to be built in the Downtown & Vicinity, there will be some changes in the overall characteristics of the population there over time. In general, the Downtown & Vicinity will become more important as a residential area, housing an increasing share of the City's population. Many older residential neighborhoods in the area will remain relatively unchanged, however, as new neighborhoods are created in Rincon Hill, South Beach, Yerba Buena Center, and (in Alternatives A and B) Mission Bay.

The characteristics of new housing and households will be different from the overall average characteristics for the Downtown & Vicinity described in the setting (see p. VI.C.11). Although new housing units will be small in size relative to citywide averages, they will be larger, on average, than existing housing units in the Downtown & Vicinity, most of which are small apartments in older buildings. The households in new housing will be somewhat larger than the average for the Downtown & Vicinity. There will be more young people, more families and more workers. The households in new housing generally will have higher incomes than the average household in the Downtown & Vicinity in 1985.

The Downtown & Vicinity will continue to be racially and ethnically mixed. The older neighborhoods will continue to provide some of the lowest-cost housing in the City and will continue to house a large share of the City's elderly beyond their working years, the unemployed, disabled, and others needing public assistance.

In the rest of the City, most of the increase in housing and population will occur in neighborhoods east of Twin Peaks, with most of the addition of housing in the Van Ness area, Fillmore/Western Addition, Hunters Point, and Executive Park. In western parts of the City, there will be some infill housing development, but increases in population and in workers living in those areas will result primarily from on-going changes over time in the characteristics of households living in existing housing. The change in housing/households, population and employed population in each of the four districts of the City outside the Downtown & Vicinity (Northeast, Northwest, Southeast, Southwest, see Figure VI.C.1, p. VI.C.32) will be smaller than the change in the Downtown & Vicinity.

There would be a relatively small difference between the scenarios for each Alternative in the distribution of housing and population growth within the City through the year 2000. Alternative N would result in somewhat more new housing and population in the Downtown & Vicinity outside Mission Bay and in the rest of the City over that time period than would Alternatives A and B. Some of the demand for new housing in the City would shift to other new housing areas (e.g., Van Ness, Rincon Hill, Fillmore / Western Addition) since it would not be accommodated in Mission Bay. Housing in other areas would be absorbed faster with Alternative N than it would with Alternatives A or B. There also would be more infill development on vacant residentially zoned land and lots built at less than allowable density in the western parts of the City with Alternative N than with Alternatives A and B. (Chapter VII. Variations on Alternatives, p. VII.1, discusses a housing variant of Alternative N.)

Regional Context

Forecasts prepared by the Association of Bay Area Governments (ABAG) provide a future scenario for the rest of the Bay Area in 2000. Population in the rest of the region is expected to reach about 5.6 million in 2000, with employed population totalling about 3.2 million (see Table VI.C.10). The growth of employed population is expected to exceed the growth of population as labor force participation is expected to continue to increase. The ABAG forecast represents a continuation of past trends, although at slower rates of increase. Population is expected to increase at an annual compound rate of 0.8%, and employed population is expected to increase at an annual compound rate of 1.7%.

Most of the growth is forecast to occur in the East Bay (almost 60% of population and employed population growth in the rest of the region is forecast for East Bay counties). In general, most new housing will be built in peripheral parts of the region, and parts of Napa, Solano, Sonoma, and Santa Clara Counties will become increasingly urbanized.

Characteristics of the population in closer-in communities will continue to change over time. Workers will settle in close-in communities where access to established employment centers is good as well as in suburban communities where new employment centers are emerging. The share of the region's population in the East Bay and North Bay will increase, while the share in the South Bay will decline.

For the Bay Area region including San Francisco, total population is expected to reach about 6.4 million by 2000. San Francisco's share of total regional population will decline over time from about 13% in 1985 to about 12% in 2000. Although the City's population will grow, population in the rest of the region will grow at a faster pace. It is expected that the overall character of San Francisco's population will continue to remain different from that of the rest of the region as a whole. San Francisco will continue to have the characteristics of an urban center (see the comparison of characteristics in the preceding setting section, p. VI.C.9).

TABLE VI.C.10: REST OF REGION POPULATION AND EMPLOYED POPULATION, 1985 AND 2000

Bay Area Counties	Population 1985	Population 2000/a/	Population 1986-2000	Employed Population 1985	Employed Population 2000/a/	Employed Population 1986-2000
East Bay	2,316,300	2,716,900	+400,600	1,105,700	1,513,400	+407,700
Alameda	1,208,200	1,357,500		586,100	757,600	
Contra Costa	724,000	845,600		349,400	486,700	
Napa	104,600	123,600		47,700	67,200	
Solano	279,500	390,200		122,500	201,900	
South Bay	2,020,200	2,188,500	+168,300	1,087,000	1,333,400	+246,400
San Mateo	617,100	631,900		333,800	391,000	
Santa Clara	1,403,100	1,556,600		753,200	942,400	
North Bay	566,500	680,500	+114,000	282,900	375,400	+92,500
Marin	227,100	239,700		126,200	147,200	
Sonoma	339,400	440,800		156,700	228,200	
TOTAL REST OF REGION EXCLUDING SAN FRANCISCO	4,903,000	5,585,900	+682,900	2,475,600	3,222,200	+746,600

/a/ Association of Bay Area Governments, Projections '85.

SOURCE: Recht Hausrath & Associates

Different regional scenarios have not been prepared for each of the Mission Bay Alternatives. While some differences could occur, they would be very small by the year 2000. Moreover, the small differences would be difficult to allocate to various corridors within the region.

Build-out/2020

The 2020 scenarios are order-of-magnitude estimates describing possible future growth that could occur over the Mission Bay build-out period. The forecasts are based on long-term demographic and labor force trends.

The rate of population growth is expected to slow somewhat through that time period. The rate of growth of the labor force is expected to slow significantly, a trend that applies for the nation, state and region as well as for San Francisco. Since the labor force supplies workers, the slowing rate of labor force growth affects the rate of employment growth (see VI.B. Land Use, Business Activity and Employment, p. VI.B.69).

Citywide Context

The 2020 scenarios for future housing/households, population and employed population in the City reflect generally applicable long-term demographic trends. They also reflect assumptions about factors specific to San Francisco. The forecasts assume no major changes in zoning or planning policy (besides those currently under study or proposed) that would either expand the supply of land zoned for residential use or affect allowable densities for residential development. The potential for new housing development in San Francisco is assumed to be that identified in the City's 1984 Residence Element.

Housing and population are expected to continue to increase in San Francisco through the build-out/2020 time period (see Table VI.C.11). The addition of housing in the City would range from 14,000 units (with Alternative N) to 21,000 units (with Alternative B) over the 20 years from 2001 through 2020. Population growth would range from about 35,000 (with Alternative N) to 50,000 (with Alternative B).

There is a much greater difference between the scenarios for each Alternative from 2001 through 2020 than there is in the earlier time period. During the 2001-2020 time period, most of the differences in Mission Bay housing development (and population growth)

TABLE VI.C.11: SAN FRANCISCO HOUSING UNITS, HOUSEHOLDS, POPULATION, AND EMPLOYED POPULATION, 1985, 2000 AND BUILD-OUT/2020

		Scenario for Alternative A			Scenario for Alternative B			Scenario for Alternative N		
Downtown & Vicinity/a/	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
Housing Units	25,640	34,730	43,800	+9,070	34,730	46,100	+11,370	32,080	36,100	+4,020
Households	24,720	33,560	42,300	+8,740	33,560	44,500	+10,940	30,910	34,800	+3,890
Population	46,330	62,650	79,500	+16,850	62,570	83,900	+21,330	57,420	64,800	+7,380
Employed Population	19,220	29,850	40,000	+10,150	29,850	42,600	+12,750	26,770	31,200	+4,430
Rest of City										
Housing Units	297,060	304,470	314,300	+9,830	304,470	314,400	+9,930	305,620	315,600	+9,980
Households	285,320	292,480	301,700	+9,220	292,480	302,000	+9,520	293,630	302,900	+9,270
Population	695,240	723,130	751,000	+27,870	723,210	751,500	+28,290	725,210	753,300	+28,090
Employed Population	352,830	376,730	389,000	+12,270	376,730	389,300	+12,570	378,000	390,400	+12,400
TOTAL CITY										
Housing Units	322,700	339,200	358,100	+18,900	339,200	360,500	+21,300	337,700	351,700	+14,000
Households	310,040	326,040	344,000	+17,960	326,040	346,500	+20,460	324,540	337,700	+13,160
Population	741,570	785,780	830,500	+44,720	785,780	835,400	+49,620	782,630	818,100	+35,470
Employed Population	372,050	406,580	429,000	+22,420	406,580	431,900	+25,320	404,770	421,600	+16,830

NOTE: The cumulative scenarios for build-out of Mission Bay EIR Alternatives are represented by order-of-magnitude estimates in the table. The scenarios represent a possible future context for growth in the rest of the Downtown & Vicinity and the total City that serves as a background estimate for cumulative analysis in the Mission Bay EIR. Appendix C. Housing and Population, pp. XIV.C.14-XIV.C.16, provides more information on the forecasting approach and methodology and identifies data sources.

/a/ The Downtown & Vicinity includes the Mission Bay Project Area.

SOURCE: Recht Hausrath & Associates

appear as differences in citywide housing development (and population growth). That is because all other major remaining opportunity sites for housing in the City (under existing zoning) would be built-out before the end of this period. Thus, housing built in Mission Bay adds to total housing built in the City; it does not represent housing that would be built somewhere else in the City if not in the Project Area since few other sites would remain by this time. Further, in Alternatives A and B, the differences in total housing units in the Project Area would not be evident until after 2000 because housing would be developed at similar rates (units per year) in each Alternative. Consequently, differences in total housing units in the Project Area would become apparent after Alternative A's 7,700 units were completed (sometime after year 2000) when housing development in Alternative B would still continue to occur until the total of 10,000 units were completed.

Table VI.C.11, p. VI.C.47, illustrates the importance of Mission Bay housing to the citywide scenarios. Housing added in the rest of the City from 2001 through 2020 would be about the same for all scenarios. The differences are in the amount added in the Downtown & Vicinity, reflecting different amounts of Mission Bay housing.

Population growth in the City in the 2001-2020 period would mirror the additions of housing and households. While, as in the earlier forecast period, it is assumed that households in new housing would be smaller on average, the overall average household size for the City is assumed to remain constant from 2000 to 2020. That means that, as in the earlier period, there would be some increase in population in existing housing. The degree of change in that factor would be less from 2001 through 2020 than it would be from 1986 through 2000, however.

By 2020, population in the Downtown & Vicinity would range from 65,000 (with Alternative N) to 84,000 (with Alternative B). With Alternative N, 20% of total population growth in the City would occur in the Downtown & Vicinity. With Alternative A, the percentage would be 37% and with Alternative B, 43%, for the 2001 through 2020 period.

The scenarios for employed population in the City through 2020 reflect aging of the population and the effect of that demographic pattern on the labor force. The baby boom that supplies much of the workforce through the latter part of the 1900s and the early part of the next century will be reaching retirement age by 2020. (For example, a person born in 1954, about the middle of the baby boom, will be 66 years old in 2020.) There are fewer people (workers) in the generation following the baby boom. Moreover, since most women already will be working, there will be less ability over time to expand the labor supply through substantial increases in their labor force participation. For continued economic growth, labor force participation in general is expected to be higher and people are expected to work longer. Unemployment rates also will be lower and wage rates somewhat higher to attract people to the workforce. Nevertheless, the rate of growth in labor force and employed population will be substantially slower than during the earlier forecast period.

In San Francisco, most growth in employed population from 2001 through 2020 will come through the addition of housing in the City. In the earlier period, about one-half the growth was attributable to additional housing/households and the other half to changes in the characteristics of those in existing housing. The potential for growth due to changing population characteristics will be limited by the longer-term demographic scenario described above.

As a consequence, the distribution of the growth of employed population throughout the City closely parallels the distribution of additional housing/households. With Alternatives A and B, about 50% of total citywide growth in employed population would occur downtown. With Alternative N, about 25% of the increase would occur downtown.

Regional Context

Order-of-magnitude estimates of population and employed population in the rest of the Bay Area region in 2020 provide background for the cumulative analyses of Mission Bay at build-out. The 2020 scenarios are based on baseline projections for counties prepared by the California Department of Finance (DOF). The DOF projections assume "no fundamental institutional changes and no major change to policies and practices related to air, land, and water use, housing and transportation plans and environmental issues"./24/ That is a reasonable assumption since most local planning efforts do not consider such a long-term horizon as the year 2020. The resultant future scenario represents one possible long-term outcome. Others could be developed using other assumptions. The actual outcome will vary depending on future changes in policy and plans that could occur as well as other factors such as economic growth, migration, demographics, etc.

As shown in Table VI.C.12, population in the rest of the region is expected to reach 6.5 million by 2020. The employed population would be about 3.6 million. Population growth

TABLE VI.C.12: REST OF REGION POPULATION AND EMPLOYED POPULATION, 1985, 2000 AND BUILD-OUT/2020

	Population				Employed Population			
Area of Region	1985	2000/a/	2020/b/	2001–2020	1985	2000/a/	2020/c/	2001–2020
East Bay	2,316,300	2,716,850	3,194,000	+477,150	1,105,700	1,513,400	1,723,000	+209,600
South Bay	2,020,200	2,188,500	2,487,000	+298,500	1,087,000	1,333,400	1,480,000	+146,600
North Bay	566,500	680,500	790,000	+109,500	282,900	375,400	431,000	+55,600
TOTAL REST OF REGION EXCLUDING SAN FRANCISCO	4,903,000	5,585,850	6,471,000	+885,150	2,475,600	3,222,200	3,634,000	+411,800

/a/ Association of Bay Area Governments (ABAG), Projections '85.
/b/ California Department of Finance, Population Projections for California Counties 1980-2020 with Age/Sex Detail to 2020: DOF Baseline 86, with RHA adjustments for three counties (San Mateo, Santa Clara, Marin) based on patterns established by ABAG in Projections '85 and preliminary Projections '87.
/c/ Order-of-magnitude estimates developed to provide a future scenario for cumulative analysis in the Mission Bay EIR.

SOURCE: Recht Hausrath & Associates

will continue at a somewhat lower rate than in the earlier forecast period (0.7% per year, compounded, compared to 0.8% per year, compounded, from 1986 through 2000). The rate of growth in employed population will slow significantly, however, for the reasons identified above in discussion of the citywide context (see p. VI.C.48).

When San Francisco is included, population growth in the total Bay Area would be about 930,000, bringing total regional population to about 7.3 million people in 2020. San Francisco's share of total regional population will continue to decline over time.

Different regional scenarios have not been prepared for the Mission Bay Alternatives. While some differences would occur, they would be small relative to the large totals for population and employed population in the rest of the region. Moreover, it would be difficult to allocate differences to the various corridors within the region. The implications of possible differences are discussed in terms of the effects of the Mission Bay Alternatives on housing market conditions throughout the rest of the region (see p. VI.C.92).

RELATIONSHIP BETWEEN EMPLOYMENT AND EMPLOYED POPULATION

The forecasts for housing, households, population, and employed population presented above are consistent with forecasts for employment and land use presented in VI.B. Land Use, Business Activity, and Employment, pp. VI.B.53-VI.B.79. Each describes a different aspect of the same future context. This section describes the relationship between those different aspects of the forecasts. Specifically, it focuses on forecasts of employment and employed population.

The purpose is to provide background for consideration of the housing market in the future and the implications of Mission Bay development and growth in the Downtown & Vicinity generally on housing market conditions in the City and region. This section also provides information for transportation analyses. The relationship between jobs and employed residents and the resultant scenario of where workers live are important considerations for forecasts of future travel patterns. Further, it also is the purpose of this section to demonstrate that Mission Bay and other parts of the Downtown & Vicinity were considered within the context of other employment growth in the City and region.

The section begins with the regional perspective, where employment (jobs) and employed population (labor force) "match", allowing for limited commuting into and out of the region. Next, the discussion extracts San Francisco from the regional scenario, considering jobs in the City, City residents who work, and those employed in the City who reside in San Francisco and elsewhere in the region. It considers the overall relationship between jobs and employed residents and housing in San Francisco in the future. Then, attention is focussed on the Downtown & Vicinity including Mission Bay, extracting that area from the citywide scenario. Forecasts are provided for future places of residence of people employed in the Downtown & Vicinity and future places of work for people living in the Downtown & Vicinity.

Regional and Citywide Relationships Between Employment and Employed Population: 2000 and Build-out/2020

Regional Perspective

Employment growth throughout the region, and growth of employed population occupying the region's housing, were considered in the EIR analyses in terms of: (1) how the forecasts of employment and employed population compare and (2) how employment and employed population are distributed throughout the region. The analyses confirmed that the forecasts for employment (in Mission Bay, other parts of the Downtown & Vicinity, and the rest of the City and region) and employed population (throughout the City and region) are consistent and realistic from an overall regional perspective.

At the regional level, the number of employed residents and the number of jobs are about equal. There are residents of the region who commute to jobs outside the Bay Area (e.g., in Davis or Sacramento) and there are jobs in the region held by persons who reside outside the Bay Area (e.g., in Santa Cruz and San Joaquin Counties). The net result for 1985 was that the numbers of regional in-commuters and out-commuters were about equal, so the number of jobs and the number of employed residents are closely matched from the regional perspective.

Over time, job growth in the region is expected to exceed growth of employed residents in the region. Thus, net in-commuting will increase. In essence, the region as an economic unit will expand over time and become larger than the nine Bay Area counties. Net in-commuting will represent a relatively small share of all jobs in the nine-county region:

about 2.5% of the 3.7 million jobs expected in 2000 and about 3% of the 4.2 million jobs expected in 2020 (see Table XIV.C.7, p. XIV.C.17).

Citywide Perspective

Jobs and Employed Residents in San Francisco. In San Francisco there will be slower economic growth in the future, and more housing production relative to job growth, than in the past. However, the rate of growth of employed residents will be slower than in the past because of demographic trends influencing changes in overall labor force participation and workers per household. In other words, although there will be more housing in San Francisco to accommodate residents who work, proportionally more housing will be needed to accommodate job growth in the future compared to the past because a smaller share of the increase in employed residents will come from those occupying the existing housing stock.

Overall comparisons of changes in jobs and in employed residents of San Francisco show that the ratio of jobs to employed residents is expected to increase (see Table VI.C.13). By 2000, the temporarily low ratio of jobs to employed residents in 1985 is estimated to return to a ratio similar to that in 1981. Some further increase is expected by 2020. Future increases in the ratio of jobs to employed residents in San Francisco would be at much slower rates than occurred in the City over the past two decades, however (see p. VI.C.27 and Table VI.C.5, p. VI.C.28). In the future, the total number of jobs in San Francisco will continue to exceed the number of employed residents of the City, reflecting the City's historic role as the center city of a large region.

By 2020, there would be differences between the scenarios for each Mission Bay Alternative in the number of jobs and employed residents in the City and in the ratios between them. The scenario for Alternative B would have the lowest ratio of jobs to employed residents because it would result in the least employment growth and the most employed population growth since it would have the most housing development. The scenario for Alternative N would have the highest ratio because it would have the smallest growth of employed population relative to growth of employment, primarily because housing development in the City would be lowest under that Alternative. The ratio of jobs to employed residents in the scenario for Alternative A would fall between those for the other Alternatives, since Alternative A would result in relatively large amounts of both employment growth and growth of housing and employed population.

TABLE VI.C.13: SAN FRANCISCO JOBS AND EMPLOYED RESIDENTS, 1981, 1985, 2000, AND BUILD-OUT/2020

			Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
	1981	1985	2000	2020	2000	2020	2000	2020
Jobs/a/	589,300	584,900	721,590	794,800	719,310	785,600	721,050	791,500
Employed Residents/b/	345,360	372,050	406,580	429,000	406,580	431,900	404,770	421,600
Ratio of Jobs to Employed Residents/c/	1.71:1	1.57:1	1.77:1	1.85:1	1.77:1	1.82:1	1.78:1	1.88:1
Residents Working in San Francisco/d/	295,630	305,820	335,420	362,500	334,300	363,100	334,240	359,200
Employed Residents: Percent Working in San Francisco/e/	85.6%	82.2%	82.5%	84.5%	82.2%	84.1%	82.6%	85.2%
Jobs: Percent Held by City Residents/f/	50.2%	52.3%	46.5%	45.6%	46.5%	46.2%	46.4%	45.4%

NOTE: This table presents estimates for both 1981 and 1985 for two reasons. One is that 1981 estimates provide the starting point for much of the housing and population analysis because Census data are available for 1980 and the C-3 District Employer/Employee Surveys were done in 1981. The other reason is that the change from 1981 to 1985 is not considered to be typical of long-term trends, so that providing information for both years offers a better basis for comparison when considering forecasts and analyses for future years.

/a/ See Table VI.C.5, p. VI.C.28, and Table VI.B.27, p. VI.B.77.
/b/ See Table VI.C.5, p. VI.C.28, and Table VI.C.11, p. VI.C.47.
/c/ The ratios are derived by dividing the number of San Francisco jobs by the number of employed City residents.
/d/ See Table VI.C.5, p. VI.C.28. The 2000 and 2020 forecasts were developed based on cumulative analysis of employment and employed residents in San Francisco and the rest of the region. More background is provided in Appendix C. Housing and Population, pp. XIV.C.14-XIV.C.19.
/e/ The percentages are derived by dividing the number of City residents working in San Francisco by the total number of employed residents in the City.
/f/ The percentages are derived by dividing the number of City residents working in San Francisco by the number of San Francisco jobs.

SOURCE: Recht Hausrath & Associates

City Residents Working in San Francisco. The number of City residents who work in San Francisco will continue to increase in the future (see Table VI.C.13). They will continue to represent a large percentage of all City residents who work (about 82% to 83% in 2000 and 84% to 85% in 2020 depending on the Alternative). Although that percentage has declined over time in the past, the forecasts reflect a leveling off of the decline and eventual increases back to earlier levels as labor force growth in other parts of the region slows, and as relatively more housing is added in San Francisco.

The number of San Francisco jobs held by City residents will continue to increase in the future (see Table VI.C.13). However, the percentage of jobs held by residents will decline in the future, reflecting the forecast that labor force in the City will not grow as much as employment, while population and labor force in areas outside San Francisco will grow by larger amounts. City residents who work in San Francisco will hold just less than half of the City's jobs (about 46% to 47% in 2000 and 45% to 46% in 2020 depending on the Alternative).

Residents of the Rest of the Region Working in San Francisco. Because of relatively large labor force growth in areas of the region outside San Francisco, residents of the rest of the region will hold a larger number and percentage of San Francisco jobs in the future (see Table VI.C.14). Of particular relevance for San Francisco, labor force growth is forecast in closer-in parts of the region (San Mateo, Marin, and much of Alameda and Contra Costa Counties) where it is reasonable to expect that people will travel to jobs in San Francisco given the time and cost associated with commute trips. (Discussion of assumptions about the ability of the transportation system to handle increased commuters is provided below, p. VI.C.57.)

Those who work in San Francisco and live outside the City will continue to represent a relatively small percentage of employed residents in the rest of the region. That percentage will decline in the future because of larger growth of jobs and employed residents in the rest of the region compared to growth in San Francisco.

Residence Patterns of Workers in the Downtown & Vicinity

This subsection focuses on employment in the Downtown & Vicinity including Mission Bay. It presents information on the places of residence of all persons employed in jobs in the Downtown & Vicinity, including those living in San Francisco and those living in other counties in the region.

TABLE VI.C.14: RELATIONSHIP BETWEEN JOBS IN SAN FRANCISCO AND THE REGION'S EMPLOYED RESIDENTS, 1981, 1985, 2000, AND BUILD-OUT/2020

			Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
	1981	1985	2000	2020	2000	2020	2000	2020
Jobs in San Francisco/a/	589,300	584,900	721,590	794,800	719,310	785,600	721,050	791,500
Number of Jobs Held by								
City Residents/b/	295,630	305,820	335,420	362,500	334,300	363,100	334,240	359,200
Residents of Rest of Region/b,c/	293,670	279,080	386,170	432,300	385,010	422,500	386,810	432,300
Percent of Jobs Held by								
City Residents	50.2%	52.3%	46.5%	45.6%	46.5%	46.2%	46.4%	45.4%
Residents of Rest of Region	49.8%	47.7%	53.5%	54.4%	53.5%	53.8%	53.6%	54.6%
Percent of San Francisco Employed Residents Working in San Francisco/d/	85.6%	82.2%	82.5%	84.5%	82.2%	84.1%	82.6%	85.2%
Percent of Rest of Region Employed Residents Working in San Francisco/f/	13.5% /e/	11.3%	12.0%	11.9%	11.9%	11.6%	12.0%	11.9%

NOTE: This table presents estimates for both 1981 and 1985 for two reasons. One is that 1981 estimates provide the starting point for much of the housing and population analysis because Census data are available for 1980 and the C-3 District Employer/Employee Surveys were done in 1981. The other reason is that the change from 1981 to 1985 is not considered to be typical of long-term trends, so that providing information for both years offers a better basis for comparison when considering forecasts and analyses for future years.

/a/ See Table VI.C.5, p. VI.C.28, and Table VI.B.27, p. VI.B.77.
/b/ See Table VI.C.5, p. VI.B.28. The 2000 and 2020 forecasts were developed based on the cumulative analysis of employment and employed residents in San Francisco and the rest of the region. More background is provided in Appendix C. Housing and Population, pp. XIV.C.14-XIV.C.19.
/c/ Includes a small number of persons working in San Francisco who reside outside the nine-county Bay Area region.
/d/ See Table VI.C.5, p. VI.C.28, and Table VI.C.11, p. VI.C.47, for estimates of the employed population in San Francisco.
/e/ This percentage compares the number of employed residents from the 1980 Census with the estimate of employment in San Francisco in 1981. Thus, the percentage is slightly high to the extent that the number of employed residents was higher in 1981 than in 1980.
/f/ See Table VI.C.12, p. VI.C.50, for forecasts of the future employed population of the rest of the region.

SOURCE: Recht Hausrath & Associates

The forecasts for future residence patterns of workers in the Downtown & Vicinity are based on forecasts of jobs and employed residents for San Francisco and other parts of the region and on consideration of how jobs in San Francisco would compete for labor. It was assumed that there would be no major changes in the relative accessibility to the Downtown & Vicinity from corridors of the region. Absolute limits on capacities or on people's willingness to travel under changing conditions were not assumed, even though travel times would increase and changes in commute modes would be needed. Further, no major increases in capacity were assumed that would favor one corridor over another in the future, although over the long term major increments of capacity also would be required (see VI.E. Transportation Mitigation, p. VI.E.198).

The residence patterns represent reasonable scenarios for the EIR analyses. The transportation chapter considers the transportation implications of those scenarios; see VI.E. pp. VI.E.74-VI.E.80. Future changes in access could result in different residence patterns from those presented here.

2000

San Francisco Compared to the Rest of the Region. The number of jobs in the Downtown & Vicinity held by San Francisco residents will increase through 2000 (see Table VI.C.15). The percentage of those jobs held by City residents will decline over time, however (see Table XIV.C.10, p. XIV.C.25). Those City residents working in the Downtown & Vicinity will represent more than half of all City residents who work in 2000. That percentage (City residents working in the Downtown & Vicinity as a percentage of all City residents who work) will increase from 1985 but will remain slightly below the percentage in 1981 (see Table XIV.C.11, p. XIV.C.26).

The number of jobs in the Downtown & Vicinity held by persons living in the rest of the region outside of San Francisco also will increase as will the percentage of jobs in the Downtown & Vicinity held by those living outside the City. The increase in commuters from outside San Francisco to the Downtown & Vicinity will exceed the increase in City residents working there because of the relatively large growth of the employed population in parts of the region surrounding San Francisco, where it is reasonable to expect that people will travel to jobs in the Downtown & Vicinity given the time and cost associated with commute trips. Although commuting to the Downtown & Vicinity will increase,

TABLE VI.C.15: RESIDENCE PATTERNS OF WORKERS IN THE DOWNTOWN & VICINITY, 1981, 1985, AND 2000

			Scenario for Alternative A/a/		Scenario for Alternative B/a/		Scenario for Alternative N/a/	
Place of Residence	1981	1985	2000	1986-2000	2000	1986-2000	2000	1986-2000
San Francisco	191,080	196,790	221,600	+24,810	219,740	+22,950	220,080	+23,290
Downtown & Vicinity	11,230	12,500	20,180		20,180		18,020	
Rest of City	179,850	184,290	201,420		199,560		202,060	
East Bay	86,100	80,270	132,450	+52,180	131,100	+50,830	132,090	+51,820
Alameda	44,930	41,990	69,500		68,720		69,460	
Contra Costa	37,330	34,710	55,690		55,190		55,420	
Napa/Solano	3,840	3,570	7,260		7,190		7,210	
South Bay	43,870	41,300	56,940	+15,640	56,250	+14,950	56,650	+15,350
San Mateo	40,960	38,620	52,980		52,380		52,730	
Santa Clara	2,910	2,680	3,960		3,870		3,920	
North Bay	24,870	23,210	32,990	+9,780	32,500	+9,290	32,700	+9,490
Marin	22,120	20,670	28,430		28,030		28,200	
Sonoma	2,750	2,540	4,560		4,470		4,500	
Other	160	160	300	+140	300	+140	310	+150
TOTAL	346,080	341,730	444,280	+102,550	439,890	+98,160	441,830	+100,100

NOTE: This table presents estimates for both 1981 and 1985 for two reasons. One is that 1981 estimates provide the starting point for much of the housing and population analysis because Census data are available for 1980 and the C-3 District Employer/Employee Surveys were done in 1981. The other reason is that the change from 1981 to 1985 is not considered to be typical of long-term trends, so that providing information for both years offers a better basis for comparison when considering forecasts and analyses for future years.

The percentage distributions summarizing residence patterns are presented in Appendix C. Housing and Population. Table XIV.C.10, p. XIV.C.25, summarizes residence patterns as percentages of jobs in the Downtown & Vicinity. Table XIV.C.11, p. XIV.C.26, summarizes residence patterns as percentages of employed residents of each place.

/a/ The 2000 forecasts were developed based on the cumulative analysis of employment and employed residents in San Francisco and the rest of the region. More background is provided in Appendix C. Housing and Poplation, pp. XIV.C.20-XIV.C.24.

SOURCE: Recht Hausrath & Associates

those people will represent a declining percentage of total employed population in counties outside San Francisco as relatively more of the region's employed population works in the growing employment centers in the Bay Area outside San Francisco.

By 2000, residence patterns scenarios for each Alternative would not differ substantially. The small differences that would exist reflect differences in employment in the Downtown & Vicinity, in the employed population of the City and in the growth of employed residents of the Downtown & Vicinity.

Distribution Within the Region. About half of the workers in the Downtown & Vicinity, 49.8% to 50.0% depending on the Alternative, would live in San Francisco in 2000. The next largest numbers would live in Alameda, Contra Costa, San Mateo, and Marin Counties, in that order (see Table VI.C.15). Together, those four counties surrounding San Francisco would house about 46% of the people working in the Downtown & Vicinity (see Table XIV.C.10, p. XIV.C.25). The remaining 3.5% of those working in the Downtown & Vicinity would reside in more-peripheral counties: Solano, Napa, Sonoma, and Santa Clara. Only a small number of such workers would live outside the nine-county Bay Area region.

Grouped by commute corridors, about 50% of those working in the Downtown & Vicinity would live in San Francisco, about 30% would live in the East Bay, about 13% in the South Bay, and about 7% in the North Bay in 2000 (see Table XIV.C.10, p. XIV.C.25).

Among corridors, the largest numerical increase in people working in the Downtown & Vicinity is expected from the East Bay. That reflects the large growth of employed population in East Bay counties. People working in the Downtown & Vicinity will represent a smaller percentage of total employed population in the East Bay in 2000 than in 1981 (see Table XIV.C.11, p. XIV.C.26), although there will be differences between counties. People working in the Downtown & Vicinity are expected to represent an increasing percentage of the employed population of Alameda County in the future (because of relatively good access to San Francisco) and decreasing percentages of the employed population of the other East Bay counties (because of job growth in those counties and because much growth of employed population will occur in areas of those counties more distant from San Francisco).

Among corridors, the second largest numerical increase in people working in the Downtown & Vicinity will be from San Francisco, followed by the increase in workers from the South Bay. The increase in City residents reflects additional housing and growth of the employed population in the City, particularly in the Downtown & Vicinity. The increase from the South Bay reflects growth of the employed population there as well as some improvement in access to jobs in the Downtown & Vicinity. The increase from the North Bay will be the smallest among the various commute corridors. Increasing competition for labor due to job growth in the North Bay will make it likely that much of the growth in commuters to the Downtown & Vicinity will be limited to Marin County residents with relatively good access to San Francisco. The percentage of the employed population in the South Bay and North Bay represented by those working in the Downtown & Vicinity will decline from 1981 levels (see Table XIV.C.11, p. XIV.C.26).

Distribution Within San Francisco. The number of people both working and living in the Downtown & Vicinity will increase by 2000. The number of people working in the Downtown & Vicinity and living in other parts of the City also will increase by 2000. The largest increase in City residents working in the Downtown & Vicinity will be those also living in that area. Although the number of persons both living and working in the Downtown & Vicinity in 2000 (about 20,200 as shown in Table VI.C.15 p. VI.C.58) will represent about 4.5% of jobs in the Downtown & Vicinity, they will represent about 30% of the increase in City residents employed in the Downtown & Vicinity from 1986 through 2000. That reflects the increasing importance of the contribution of housing development in the Downtown & Vicinity to the City's housing stock and the relatively high propensity of residents in the Downtown & Vicinity to also work there. As a consequence, although the percentage of jobs in the Downtown & Vicinity held by City residents will decline in the future, the percentage held by residents of the Downtown & Vicinity will increase.

Build-out/2020

San Francisco Compared to the Rest of the Region. The number of jobs in the Downtown & Vicinity held by San Francisco residents will increase through 2020 (see Table VI.C.16). The percentage of those jobs held by City residents will decline only slightly in this time period (2001-2020) because job growth slows relative to growth of the City's employed population (see Table XIV.C.12, p. XIV.C.27). City residents working in the Downtown & Vicinity will continue to represent more than half of all City residents who work. That percentage will increase from 2000 and be at its highest level by 2020 (see Table XIV.C.13, p. XIV.C.28), reflecting the large growth of housing and employed population in the Downtown & Vicinity in the future, close to jobs in the area.

TABLE VI.C.16: RESIDENCE PATTERNS OF WORKERS IN THE DOWNTOWN & VICINITY, 1985, 2000 AND BUILD-OUT/2020

		Scenario for Alternative A			Scenario for Alternative B			Scenario for Alternative N		
Place of Residence	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
San Francisco	196,790	221,600	245,500	+23,900	219,740	243,600	+23,860	220,080	242,100	+22,020
Downtown & Vicinity	12,500	20,180	27,600		20,180	29,300		18,020	21,200	
Rest of City	184,290	201,420	217,900		199,560	214,300		202,060	220,900	
East Bay	80,270	132,450	150,200	+17,750	31,100	145,200	+14,100	132,090	149,400	+17,310
South Bay	41,300	56,940	68,100	+11,160	56,250	63,000	+6,750	56,650	68,000	+11,350
North Bay	23,210	32,990	39,400	+6,410	32,500	36,700	+4,200	32,700	39,300	+6,600
Other	160	300	800	+500	300	600	+300	310	800	+490
TOTAL	341,730	444,280	504,000	+59,720	439,890	489,100	+49,210	441,830	499,600	+57,770

NOTE: The forecasts of future residence patterns were developed based on the cumulative analysis of employment and employed residents in San Francisco and the rest of the region. More background is provided in Appendix C. Housing and Population, pp. XIV.C.20-XIV.C.24.

The percentage distributions summarizing residence patterns among corridors of the region are presented as supplemental tables in Appendix C. Table XIV.C.12, p. XIV.C.27, summarizes residence patterns as percentages of jobs in the Downtown & Vicinity. Table XIV.C.13, p. XIV.C.28, summarizes the residence patterns as percentages of employed residents in each corridor.

SOURCE: Recht Hausrath & Associates

The number of jobs in the Downtown & Vicinity held by persons living outside San Francisco also will increase by 2020. The percentage of jobs held by those people commuting from outside San Francisco will increase slightly by 2020. The increase in commuters to the Downtown & Vicinity from 2001 through 2020 will be less than the increase forecast from 1986 through 2000. Over time, the increase in commuters from outside San Francisco will continue to be larger than the increase in City residents working in the Downtown & Vicinity, but the split will be more even over the long term. The differences over the long term will be due to relatively slower rates of job growth and more growth of housing and employed residents in the City relative to job growth.

By 2020, there would be differences in residence patterns between Alternatives. The implications are discussed in subsequent sections and chapters of the EIR (for example, they are discussed as implications for the housing market in the rest of the region [see p. VI.C.94] and are reflected in the cumulative transportation impact analyses in VI.E. Transportation).

Distribution Within the Region. The 2020 scenarios are similar to those for 2000. About half of those working in the Downtown & Vicinity would live in San Francisco about 30% would live in the East Bay, about 13% to 14% in the South Bay, and about 7% to 8% in the North Bay (see Table XIV.C.12, p. XIV.C.27). Among corridors, the largest increase in people working in the Downtown & Vicinity from 2001 through 2020 will be from San Francisco (instead of from the East Bay as forecast from 1986 through 2000). The next largest increase will be from the East Bay, followed by the South Bay and North Bay.

It is difficult to be more specific than commute corridors for long term future residence patterns through 2020. The following generalizations apply. It is expected that, within corridors, those living closer to San Francisco and in areas with better access to the Downtown & Vicinity will be most likely to work there. The pattern assumed for the region is one where residents at the periphery of the nine-county Bay Area and beyond hold jobs in more outlying regional areas and those closer-in work in central parts of the region. It is not expected that large numbers of people will commute from the periphery or from beyond the Bay Area to the center (i.e., San Francisco).

Distribution Within San Francisco. Through 2020, residential development in the Downtown & Vicinity will become increasingly important in housing people working in the area. Differences between the scenarios for each Alternative in the amount of housing development in the Downtown & Vicinity will affect residence patterns within San Francisco. With Alternative B, almost 40% of the 2001-2020 increase in City residents working in the Downtown & Vicinity would be residents of the area, because of the large amount of housing in that Alternative. About 30% of the increase in City residents working in the Downtown & Vicinity also would be residents of the Downtown & Vicinity with Alternative A. With Alternative N, only about 14% of the increase in City residents working in the Downtown & Vicinity also would live there; the rest would live in other parts of the City.

Places of Work for Residents of the Downtown & Vicinity

2000 and Build-out/2020

The propensity of residents of the Downtown & Vicinity also to work there is assumed to remain high. The percentage of employed residents of the Downtown & Vicinity who work in that area will increase as new housing is built there. It is expected that, by 2020, about 70% of the employed residents of the Downtown & Vicinity would work in the area (see Table XIV.C.14, p. XIV.C.30). The next largest percentage would work elsewhere in San Francisco. The remainder would work outside the City. The changes expected to occur over time largely reflect characteristics of residents of new housing built in Mission Bay and other parts of the Downtown & Vicinity.

IMPACT

Given the overall future context described above, this section describes in more detail various aspects of the effects of Mission Bay Alternatives on housing, population and housing market conditions. The major topics are organized by geographic area. Project Area issues are discussed first, followed by description of citywide effects. The Nearby Areas discussion follows, as a special subset of citywide concerns. The section concludes with a discussion of regional issues.

IMPLICATIONS FOR HOUSEHOLDS AND POPULATION IN THE PROJECT AREA

New residential development in Mission Bay under Alternatives A and B would be an important addition to the City's housing supply, providing both large numbers of new units and housing opportunities for a variety of households. New housing developed in Mission Bay under Alternatives A and B would be provided in a range of unit sizes and types (see Chapter V. The EIR Alternatives and Approval Process, p. V.5). A mix of types and sizes of units is thought to fulfill marketing criteria (units oriented towards a range of potential customers will be absorbed more quickly than a large number of units targeted towards a single segment of the market); and to fulfill planning goals for satisfying a variety of housing needs and encouraging neighborhood diversity.

Mission Bay, under Alternatives A and B, would be a residential neighborhood large enough to accommodate a mix of different households and people. The mix of new housing would appeal to a range of types of households. Households living in new Mission Bay housing could include the full range: singles, unrelated individuals, families with children, single-parents with children, and working couples without children. There would be housing suitable for both the elderly and the disabled.

For this EIR analysis, it is assumed that 30% of the new housing in Mission Bay would be "affordable" (see p. V.6), contributing to the mix of incomes and types of households in the Project Area./25/ In addition, the rest of the housing would be offered across a range of prices and rents that reflected size, location and other characteristics of the units. Consequently, the Mission Bay neighborhood would not be homogenous in terms of household income. It would have households with a variety of income characteristics, depending on the number of workers in the household, occupations of workers in the household, the size and composition of the household, and other factors.

The fact that the Mission Bay residential community would consist entirely of new housing has implications for characteristics of Project Area households. In general, they would be smaller than average San Francisco households. That reflects the relatively smaller size of new higher density housing compared to existing housing in many San Francisco neighborhoods. Mission Bay households generally would be larger than the average household in the Downtown & Vicinity, however. That is because Mission Bay would provide many units larger than the older, high-density housing that predominates in the Downtown & Vicinity. Mission Bay also would include units larger than what has been provided in much recently built housing in that area.

Mission Bay's population under Alternatives with new housing is likely to span a range of age groups. Most Mission Bay residents in the future would be in their labor force years (generally considered ages 16 to 64). Children under 15 and people aged 65 and over could account for a substantial part of the population. The age distribution for the Mission Bay population would be similar to that for the City overall but different from that for the rest of the Downtown & Vicinity, where a higher percentage of elderly and a lower percentage of children would continue to be the pattern. Over time, while the population overall would be getting older (as the baby boom ages), Mission Bay could have a relatively younger population as a consequence of its desirability for worker households that tend to have younger members than households overall.

Most Mission Bay residents would be working. Mission Bay would appeal to workers because of its proximity to jobs in the City and, to a lesser extent, because of the relatively easy access, via reverse-commute, to employment centers in the South Bay and close-in East Bay cities. In the case of Alternative A, the large number of job opportunities in the Project Area itself would provide an additional attraction for workers to live in Mission Bay.

Most Mission Bay employed residents would work in San Francisco. In that respect, they would be similar to employed residents throughout the City. The majority of Mission Bay residents working in the City would hold jobs in the Downtown & Vicinity, including, potentially, jobs in the Project Area.

2000

Table V.7, p. V.39, presents estimates for housing units, households, population, and employed residents for Mission Bay Alternatives in 2000. As shown, Alternatives A and B would be very similar. In addition to the continued presence of the houseboat community in the China Basin Channel, both Alternatives have large amounts of new housing development. New housing would be occupied at about the same pace in each, as fast as market demand would absorb it. A reasonable average rate of absorption could range from 300-400 units per year over the long build-out period, with units occupied at a slower pace in early phases of development before the new neighborhood was established. Consequently, differences between Alternatives A and B are evident in the build-out/2020 analysis, when differences in total housing units are apparent. In 2000, Alternative N, with no new housing in Mission Bay, would differ from the other Alternatives, although the houseboat community would continue to have a home in Mission Bay as it would under the other Alternatives. (Chapter VII. Variations on Alternatives, p. VII.1, discusses a housing variant of Alternative N.)

Build-out/2020

Alternative A

By build-out, Mission Bay would be established as a sizeable San Francisco residential neighborhood under Alternative A, with 7,700 new housing units and about 14,000 residents (see Table V.7, p. V.39).

Since Alternative A would provide a mix of housing sizes and types, with 30% of the units made available at affordable prices/rents, it would attract a mix of types of households, as described above (pp. VI.C.64-VI.C.65). At build-out, the houseboat community would be part of the larger Mission Bay residential neighborhood under Alternative A.

Alternative B

Alternative B would result in the largest number of households and the largest total population in the Project Area, with 10,000 new housing units and approximately 19,000 residents, about 30% more than Alternative A (see Table V.7, p. V.39).

While there would be more people living in the Project Area under Alternative B, due to the larger number of new housing units, there would be no major differences in the characteristics of households and population in Mission Bay compared to Alternative A. Aside from housing more of each type of household, Alternative B would not differ substantially from Alternative A. At build-out, as in Alternative A, the houseboat community also would be part of the larger Mission Bay residential neighborhood.

Alternative N

At build-out, the houseboat community would be the only residential use in the Project Area, as it is now. Since the houseboat community would be limited to its present 20 berths, its population would remain relatively constant. Over time, the residents would change, although overall characteristics of the population could remain similar to those described for existing houseboat residents (see p. VI.C.15).

RELATIONSHIP BETWEEN PROJECT AREA EMPLOYMENT GROWTH AND HOUSING DEVELOPMENT

The relationship between Project Area employment growth and housing development has implications for the City's housing market and for commute patterns and transportation. Employment growth increases housing demand and housing development increases housing supply. The Project Area's Alternative land use programs can be evaluated in terms of the mix of jobs and housing that each would provide.

The relationship between jobs and housing is addressed from two perspectives in this section. First, consideration is given to the City's Office Affordable Housing Production Program (OAHPP) requirements. Second, the overall relationship between total employment growth in the Project Area under each Alternative and the amount of housing that would be added is addressed. The discussion focuses on the relationship between jobs and housing in the Project Area. Housing market implications of that relationship for the City and the region are discussed in other sections of this chapter.

The approach for identifying OAHPP requirements, evaluating the mix of Project Area jobs and housing, and considering housing affordability is described below. Consideration of the Alternatives with respect to each of those items follows.

Approach

Office Affordable Housing Production Program (OAHPP)

The City's OAHPP established requirements relating housing production to the development of additional office space in San Francisco./26/ The OAHPP ordinance requires that an office developer construct housing or pay an "in-lieu" fee to be used for housing development. As one perspective on the relationship between jobs and housing, OAHPP requirements are identified for each Alternative based on the amount of office development included in each. Housing development in the Project Area is then compared to OAHPP requirements.

Overall Jobs/Housing Mix

Consideration of the overall jobs/housing relationship for each Alternative follows an approach similar to that for the City's OAHPP./30/ The analysis is broader than that used to develop the OAHPP requirements, however. Where OAHPP focuses on office activity, the overall jobs/housing analysis accounts for all additional employment accommodated in the Project Area.

The analysis starts with employment growth in the Project Area and, through a series of calculations, develops an estimate of the increase in households with Project Area workers who would occupy housing in San Francisco. That estimate is a measure of the demand for additional housing in San Francisco associated with Project Area employment growth. The number of additional households in the City that have Project Area workers is then compared to the number of housing units added in the Project Area. In other words, demand due to Project Area employment growth is compared to supply represented by Project Area housing development. The comparison indicates whether Mission Bay development would provide additional housing (over and above that associated with Project Area employment growth) to relieve housing market pressures in San Francisco.

The analysis for estimating additional San Francisco households associated with Project Area employment growth is explained in Appendix C. Housing and Population, pp. XIV.C.29-XIV.C.31. The estimates are derived from the cumulative analysis used to define the future citywide context. The estimates were developed to apply over the entire forecast period (1980-1981 through build-out/2020)./28/

Estimating the demand for additional San Francisco housing associated with Project Area employment growth is complicated by two factors. First, not all additional workers employed in the Project Area would live in San Francisco. Thus, not all additional employment can be associated with demand for San Francisco housing. Second, not all additional Project Area workers expected to reside in San Francisco would be in additional households competing for additional housing units. The reason is that the average number of workers per household in the future is forecast to increase because of changes in occupancy of existing housing stock. Such changes would account for some of the additional workers, reducing the demand for additional housing.

Consideration of Housing Affordability

The jobs/housing analysis considers housing affordability in addition to the overall comparison of housing demand and supply described above. The household incomes of additional San Francisco households with Project Area workers would range from low to high. For the housing affordability analysis, the estimated household income distribution of San Francisco households with Project Area workers was converted to a distribution of households according to the housing prices their incomes would support./29/ That distribution was compared to estimated price ranges for units to be built in Mission Bay. The comparison provides information about how the Alternatives could affect the City's housing market. It also is useful in considering options for affordable housing in Mission Bay.

It is not expected that the housing prices that could be supported by household incomes of Project Area workers would match the housing prices of new units built in the Project Area. That is because it is not possible to provide new housing in San Francisco for all income groups without large subsidies. The difficulties of producing new housing at affordable prices/rents for a large segment of the population are not unique to San Francisco or Mission Bay; they exist throughout the region and nation (see pp. VI.C.1-VI.C.6)./30/ Thus, the EIR comparisons of incomes and housing prices should be viewed within a market context, and consideration must be given to what is feasible as well as desirable.

The estimates of household incomes for additional San Francisco households with Project Area workers are approximate and based on simplified assumptions. It is assumed that, in constant 1984 dollars, household income distributions would be similar to 1984 income distributions for San Francisco households with downtown workers in similar types of jobs. The data are for all households of downtown workers living in the City, including those in new housing and those in older units./31/

Although Mission Bay housing would be available for a range of prices and rents, the EIR assumptions focus on the number (30% of total units) priced at "affordable" levels, as defined in the Mayor's Letter, and the number (70% of total units) available at higher prices. Thus, the comparisons of resources available for housing to prices of new units divide the number of households and housing units into two groups: "affordable" and "other". From the perspective of the supply of units in Mission Bay, the prices of "affordable" new housing are assumed to range from $105,000 to $150,000 and average $125,000 in 1984 dollars (per Mayor's Letter). "Other" housing would include units priced above $150,000. (The use of housing prices in the analysis is a simplification and is not intended to imply that only for-sale housing would be built.) From the perspective of the worker households looking for housing, "affordable" housing would include the units priced at $150,000 and below, and "other" housing would include units priced above $150,000. (Chapter VII. Variations on Alternatives, p. VII.47, discusses the implications of different options for the percentage of affordable housing in the Project Area.)

Comparison of Alternatives at Full Development

Build-out/2020

Three tables summarize the relationship between Project Area employment growth and housing development for the Alternatives. The tables correspond to the three perspectives described above. Table VI.C.17 considers the requirements of the City's Office Affordable Housing Production Program (OAHPP). Table VI.C.18 addresses the overall relationship between Project Area employment growth, additional housing units to accommodate additional San Francisco households with Project Area workers, and housing units to be added in the Project Area. Table VI.C.19 presents the housing affordability analysis for the additional households and housing units identified in Table VI.C.18. All the tables compare Alternatives in terms of the jobs and housing that each would include when fully developed and occupied. Phasing of employment growth and housing development and the interim analysis year 2000 are addressed after the discussion of build-out/2020.

Alternative A. For office development in Alternative A, the City's OAHPP would require either payment of an in-lieu fee of $21.89 million for production of housing or

TABLE VI.C.17: CONSIDERATION OF OFFICE AFFORDABLE HOUSING PRODUCTION PROGRAM (OAHPP) REQUIREMENTS, BY ALTERNATIVE, BUILD-OUT/2020

	Alternative A	Alternative B	Alternative N
Additional Gross Square Feet of Office Space/a/	4,100,000	1,000,000.	1,500,000 /b/
Compliance Through Payment of In-Lieu Fee			
Payment Required (millions)/c/	$21.89	$5.34	$8.01
Compliance Through Construction of Housing			
Number of Units Required/d/	1,583	386	579
Units to Be Affordable to Households of Moderate or Low Income/e/	981	239	359
Other Units	602	147	220
New Housing Units in Project Area	7,700	10,000	0
Units to Be Affordable to Households of Middle or Moderate Income/f/	2,310	3,000	0
Other Units	5,390	7,000	0

NOTE: The Office Affordable Housing Production Program (OAHPP) was established by ordinance of the City and County of San Francisco (Ordinance #358-85, effective July 19, 1985). OAHPP requirements apply to office development projects in San Francisco proposing the net addition of 50,000 or more gross square feet of office space.

/a/ There were 32,000 square feet of office space at various locations in the Project Area in 1985 (see Table VI.B.2, p. VI.B.5). If some or all of that space was demolished for an office development project and/or was credited against new space developed, the net addition of office space in the Project Area would be less than shown and OAHPP requirements would be less (a credit of 32,000 square feet would reduce the requirements by 12 units or $170,880).

/b/ Some of the new space developed under M-2 Industrial zoning in Alternative N would be occupied by office uses. Office development of 50,000 square feet or more would be subject to OAHPP requirements. It is uncertain how much of the new M-2 Industrial space would be office and meet that size criterion. For purposes of the EIR, it is assumed that 10% of the M-2 Industrial space, or 500,000 square feet, would be subject to OAHPP requirements. The actual amount could be more or less than that estimate. It is assumed that Port-Related/M-2 would not include office development subject to OAHPP requirements.

/c/ The fee in lieu of developing housing was $5.34 per net additional gross square foot of office space as of the end of 1987.

/d/ The requirement for constructing housing is .000386 housing units per net additional gross square foot of office space.

/e/ There is a requirement that 62% of housing units constructed be affordable to households of low or moderate income for 20 years. Low- and moderate-income households include those with incomes up to 120% of median family income for households of various sizes.

/f/ As described in the Mayor's letter, it is assumed that 30% of new housing built in the Project Area would be "affordable" units priced between $100,000 and $150,000 in 1984 dollars with an average price of $125,000. Housing at these prices would be affordable to households with middle or moderate incomes, including those with incomes from 80% to 150% of median family income for households of various sizes.

SOURCE: Recht Hausrath & Associates

TABLE VI.C.18: COMPARISON OF THE ESTIMATED INCREASE IN SAN FRANCISCO HOUSEHOLDS WITH PROJECT AREA WORKERS AND HOUSING UNITS ADDED IN MISSION BAY, BY ALTERNATIVE, BUILD-OUT/2020

	Alternative A	Alternative B	Alternative N
Demand Perspective			
Additional Project Area Employment/a/	22,980	4,230	15,250
Additional Housing Units to Accommodate Additional San Francisco Households with Project Area Workers/b/	3,510	720	2,110
Supply Perspective			
Additional Housing Units in Project Area	7,700	10,000	0
Comparison			
Amount by which Project Area Housing Exceeds Housing to Accommodate Additional San Francisco Households with Project Area Workers	+4,190	+9,280	NA

NOTE: The comparisons in the table are approximate and are provided to consider implications for the City's housing market of the mix of commercial and residential land uses in the Project Area.

NA - Not Applicable.

/a/ Total Project Area employment at build-out minus employment in the Project Area in 1985 (2,000 jobs).
/b/ There are two steps involved in estimating the number of additional households with Project Area workers who would seek housing in San Francisco: 1) estimate the increase in the number of Project Area workers residing in San Francisco (since not all workers would live in the City); and 2) estimate those who would be accommodated in additional households seeking additional housing in the City (since some increase in workers will occur because of increases in the number of workers per household in the future throughout the City's households); and estimate the number of additional San Francisco households they would represent. In addition, the estimate includes units to reflect 3.5% vacancy since it is assumed that 3.5% of the units built in Mission Bay would be vacant, on average. The derivation of the estimates of additional households with Project Area workers is explained in Appendix C. Housing and Population, pp. XIV.C.29-XIV.C.34.

SOURCE: Recht Hausrath & Associates

TABLE VI.C.19: CONSIDERATION OF HOUSING AFFORDABILITY: ADDITIONAL SAN FRANCISCO HOUSEHOLDS WITH PROJECT AREA WORKERS AND NEW HOUSING ADDED IN MISSION BAY, BY ALTERNATIVE, BUILD-OUT/2020

	Alternative A	Alternative B	Alternative N
Demand Perspective			
Additional Housing Units to Accommodate Additional San Francisco Households with Project Area Workers	3,510	720	2,110
Additional Units Priced $150,000 and Below/a/	2,770	580	1,670
Additional Units Priced Above $150,000/a/	740	140	440
Supply Perspective			
New Housing Units in Project Area	7,700	10,000	0
New Units Priced $105,000 to $150,000 and Averaging $125,000/b/	2,310	3,000	0
New Units Priced Above $150,000/b/	5,390	7,000	0

NOTE: The estimates in the table are very approximate and provide additional information about how the Alternatives could affect the City's housing market. References to housing prices are in 1984 dollars.

/a/ For purposes of considering housing affordability, the household income distribution for San Francisco households with Project Area workers was estimated and then converted to a distribution of households according to housing prices their incomes would support. Appendix C. Housing and Population, pp. XIV.C.34-XIV.C.37, describes the estimates and assumptions made. The distribution of households by housing price categories was then summarized into the two groups above that approximate the two price categories used to describe the prices of new housing in Mission Bay.

/b/ The EIR assumptions about the price of new housing in Mission Bay focus on the number (30% of total units) priced at "affordable" levels as defined in the Mayor's Letter and the number (70% of total units) of "other" units available at higher prices. Those are the two categories used above.

SOURCE: Recht Hausrath & Associates

construction of 1,583 housing units, 981 to be affordable to households of moderate or low income. The number of housing units to be built in the Project Area under Alternative A (7,700) would more than satisfy the City's OAHPP housing construction requirement. The OAHPP affordability requirement would be satisfied if 981, or 12.7%, of the units were affordable to moderate- or low-income households. The price assumptions for affordable units in the Project Area imply affordability to households of middle and moderate incomes. If 12.7% were affordable to moderate-income households, the OAHPP requirement would be met./32/

If all employment growth in the Project Area is taken into consideration, the number of housing units built under Alternative A would exceed the number of units needed to accommodate additional San Francisco households with Project Area workers. The estimated number of units to accommodate such households under Alternative A (about 3,500) would represent about 45% of the number of new housing units to be built in the Project Area (7,700). The remainder (about 55% or about 4,200 units) would represent housing available to accommodate other demand besides that associated with Project Area employment growth. That amount of housing would improve the City's ability to accommodate additional households with persons working elsewhere in the City and region as well as additional households without workers.

San Francisco households with Project Area workers would be distributed across a range of household income categories and would consequently have varying abilities to pay for housing. The additional households in Alternative A would require about 2,770 housing units in the affordable category. Those units would represent 36% of housing in Alternative A, a higher percentage than the 30% assumed to be priced at affordable levels. Further, some households with Project Area workers would have incomes below the levels needed to pay the affordable new housing prices assumed in Alternative A. The results reflect the difficulties of producing new housing for lower-income households.

The above consideration of housing affordability indicates that while Alternative A would add a large amount of affordable new housing in the City, there would be some additional demand for lower-priced existing housing as a result of Project Area employment growth. The additional demand would increase competition for lower-priced units. The large number of other units added in Mission Bay would relieve demand pressures for higher-priced units, however, since Mission Bay would provide housing for households that otherwise would compete for existing stock. That would indirectly reduce demand for existing housing, including units priced around the threshold price for producing new market-rate housing without subsidies (see discussion of implications for citywide housing market conditions, pp. VI.C.81-VI.C.86).

Alternative A would provide a better balance of jobs and housing in the Project Area than Alternative N (which would accommodate a relatively large amount of employment growth without any housing development in the Project Area). Alternative B, however, would be more desirable from a housing market perspective because it would accommodate less employment growth and more housing development in the Project Area than Alternative A.

Alternative B. For office development in Alternative B, the City's OAHPP would require either payment of an in-lieu fee of $5.34 million or construction of 386 housing units, 239 to be affordable to households of moderate or low income. The number of housing units to be built in the Project Area under Alternative B (10,000) would more than satisfy the City's housing construction requirement. The OAHPP affordability requirement would be met if 239 or 2.4% of the units were affordable to moderate- or low-income households. That represents a small share of the 3,000 units in Alternative B assumed to be affordable to households of middle and moderate incomes.

If all employment growth in Alternative B is taken into consideration, the number of housing units built in the Project Area would exceed by a large amount the number of units needed to accommodate additional San Francisco households with Project Area workers. The estimated number of units to accommodate such households under Alternative B (about 720) would represent about 7% of the number of new housing units to be built in the Project Area (10,000). The remainder (about 93% or about 9,280 units) would represent housing available to accommodate other demand besides that associated with Project Area employment growth. That would include demand from households with persons working elsewhere in the City and region and households without workers. The above comparison reflects the emphasis of the Alternative B land use program on residential development over commercial development accommodating job growth.

San Francisco households with Project Area workers would have varying abilities to pay for housing. The additional San Francisco households in Alternative B would require about 580 housing units in the affordable category. Those units would represent 6% of the housing included in Alternative B, a lower percentage than the 30% assumed to be priced at affordable levels. However, some households with Project Area workers would have incomes below the levels needed to pay the affordable new housing prices assumed in Alternative B. The number of such households in Alternative B would be small.

The above comparisons indicate that Alternative B would accommodate a large amount of housing and add a large number of affordable housing units to the City. There would be some additional demand for lower-priced existing housing as a result of Project Area employment growth although the amount would be small in absolute terms and relative to the large amount of housing added in other price ranges. The housing in Alternative B would accommodate households that otherwise would compete for existing housing. The new housing would increase the availability of units in a variety of price ranges, thereby relieving demand pressures that otherwise would exist. Of particular importance to the market would be the addition of subsidized, affordable units and units priced around the threshold price for producing new market-rate housing without subsidies. Those units will remain in strong demand in the future and will continue to be difficult to produce in San Francisco. (See discussion of implications for citywide housing market conditions, pp. VI.C.81-VI.C.86.)

Compared to Alternatives A and N, Alternative B would contribute the most benefit to the City's housing market, with the most new housing, the largest number of affordable units and the smallest amount of employment growth in Mission Bay. Comparing the Alternatives at the citywide level in terms of employment growth and housing development, this conclusion would apply although the differences between Alternatives would be less than identified only for the Project Area. For example, although the number of units developed over and above those needed to accommodate Project Area employment growth in San Francisco is larger in Alternative B than in Alternative A, some of those "surplus" units would be needed to accommodate employment growth in nearby areas under Alternative B--employment growth that otherwise would be located in the Project Area in Alternative A.

Alternative N. Alternative N does not include housing in the Project Area. Thus, instead of focusing on the relationship between employment growth and housing development in the Project Area, this section addresses additional City housing demand associated with Project Area employment growth.

For office development in Alternative N, the City's OAHPP would require either payment of an in-lieu fee of $8.01 million for production of housing or construction of 579 housing units, 359 to be affordable to households of moderate or low income./33/ Because there would be no housing in the Project Area under Alternative N, office developers would have to pay the in-lieu fee or produce the required housing elsewhere in San Francisco outside the Project Area.

Overall, employment growth in the Project Area would increase demand for housing in San Francisco. The number of additional housing units to accommodate additional San Francisco households with Project Area workers is estimated at about 2,100. Additional households would be accommodated by housing added elsewhere in the City. About 1,670 of the additional San Francisco households with Project Area workers would need affordable units priced below $150,000.

Compared to Alternatives A and B, Alternative N would result in more demand pressures for housing in the City because it would add demand from Project Area employment growth without adding to the housing supply.

Phasing of Employment Growth and Housing Development and Comparison of Alternatives at Interim Analysis Year

2000

The phasing of Project Area employment growth relative to the phasing of housing development also has implications for the City's housing market. Tables VI.C.20 and VI.C.21 consider the relationship between employment growth and housing development by 2000 in order to provide an indication of how additional housing demand and supply would compare in interim years before the Alternatives are fully developed. The estimates of additional San Francisco households with Project Area workers are based on the same economic relationships used to evaluate build-out/2020 conditions for the Alternatives./34/

Alternative A. It is assumed that development of residential and commercial uses in Alternative A would proceed in tandem throughout the build-out period (see Chapter V. The EIR Alternatives and Approval Process, p. V.39 and note /4/, p. V.44). Thus, the relationships between employment growth and housing development for Alternative A at full development (described above) would apply during interim years.

TABLE VI.C.20: CONSIDERATION OF OFFICE AFFORDABLE HOUSING PRODUCTION PROGRAM (OAHPP) REQUIREMENTS, BY ALTERNATIVE, 2000

	Alternative A	Alternative B	Alternative N
Additional Gross Square Feet of Office Space by 2000/a/	1,440,000	1,000,000	1,000,000 /b/
Compliance Through Payment of In-Lieu Fee			
Payment Required (millions)/c/	$7.69	$5.34	$5.34
Compliance Through Construction of Housing			
Number of Units Required/d/	556	386	386
Units to Be Affordable to Households of Moderate or Low Income/e/	345	239	239
Other Units	211	147	147
New Housing Units in Project Area by 2000	2,850	2,740	0
Units to Be Affordable to Households of Middle or Moderate Income/f/	855	822	0
Other Units	1,995	1,918	0

NOTE: The Office Affordable Housing Production Program (OAHPP) was established by ordinance of the City and County of San Francisco (Ordinance #358-85, effective July 19, 1985). The OAHPP requirements apply to office development projects in San Francisco proposing the net addition of 50,000 or more gross square feet of office space.

/a/ There was a small amount of office space at various locations in the Project Area in 1985. If existing space was demolished for an office development project and/or was credited against new space developed, the net addition of office space in the Project Area would be less than shown and OAHPP requirements also would be less.

/b/ Although some of the new space developed under M-2 Industrial zoning in Alternative N is assumed to be office space that would be subject to the OAHPP requirements (see note /b/ in Table VI.C.17, p. VI.C.71), it is assumed that that type of larger office development under the M-2 Industrial designation would occur beyond 2000. If it were to occur earlier, the OAHPP requirement would be greater than shown above.

/c/ The fee in lieu of developing housing was $5.34 per net additional gross square foot of office space as of the end of 1987.

/d/ The requirement for constructing housing is .000386 housing units per net additional gross square foot of office space.

/e/ There is a requirement that 62% of housing units constructed be affordable to households of low or moderate income for 20 years. Low- and moderate-income households include those with incomes up to 120% of median family income for households of various sizes.

/f/ As described in the Mayor's Letter, it is assumed that 30% of the new housing built in the Project Area would be "affordable" units priced between $105,000 and $150,000 in 1984 dollars with an average price of $125,000. Housing at those prices would be affordable to households with middle or moderate incomes, including those with incomes from 80% to 150% of median family income for households of various sizes.

SOURCE: Recht Hausrath & Associates

TABLE VI.C.21: COMPARISON OF THE ESTIMATED INCREASE IN SAN FRANCISCO HOUSEHOLDS WITH PROJECT AREA WORKERS TO HOUSING UNITS ADDED IN MISSION BAY AND CONSIDERATION OF HOUSING AFFORDABILITY, BY ALTERNATIVE, 2000

	Alternative A	Alternative B	Alternative N
Demand Perspective			
Additional Project Area Employment by 2000/a/	7,930	3,170	5,110
Additional Housing Units to Accommodate Additional San Francisco Households with Project Area Workers/b/	1,210	540	710
Additional Units Priced $150,000 and Below/c/	950	430	560
Additional Units Priced Above $150,000/c/	260	110	150
Supply Perspective			
New Housing Units in Project Area by 2000	2,850	2,740	0
New Units Priced $105,000 to $150,000 and Averaging $125,000/d/	855	822	0
New Units Priced Above $150,000/d/	1,995	1,918	0

NOTE: The comparisons in the table are approximate and are provided to consider the implications on the City's housing market of the mix of commercial and residential land uses in the Project Area by 2000. References to housing prices are in 1984 dollars.

/a/ Project Area employment in 2000 minus employment in the Project Area in 1985 (2,000 jobs).

/b/ The estimates assume the same relationships used to evaluate build-out/2020 conditions (see Table VI.C.18, note /b/, p. VI.C.72). They provide an overestimate of demand by 2000 based on the cumulative analysis of growth of employed residents in San Francisco. Through 2000, proportionally more of the increase in employed residents would be due to increases in labor force participation and the number of workers per household in the existing housing stock than would be expected after that time. Thus, proportionally fewer additional households would be needed to accommodate employment growth in the earlier years through 2000 and proportionally more would be required thereafter.

/c/ For purposes of considering housing affordability, the household income distribution for San Francisco households with Project Area workers was estimated and then converted to a distribution of households according to housing prices that their incomes would support. Appendix C. Housing and Population, pp. XIV.C.34-XIV.C.37, describes the estimates and assumptions made. The distribution of households by housing price categories was then summarized into the two groups above that approximate the two price categories used to describe the prices of new housing in Mission Bay.

/d/ The EIR assumptions about the price of new housing in Mission Bay focus on the number (30% of total units) priced at "affordable" levels as defined in the Mayor's Letter, and the number (70% of total units) of "other" units available at higher prices. Those are the two categories used above.

SOURCE: Recht Hausrath & Associates

Initial Phase of Development. Similar relationships also would apply for the initial phase of development, since it would maintain the same relative pace for commercial and residential development.

Alternative B. Given the relatively small amount of employment growth and the large amount of housing development in Alternative B, the employment growth would occur sooner than the housing development. Thus, under Alternative B the relationship between jobs and housing in the Project Area in interim years would differ from the relationship at full development. However, the comparisons in Tables VI.C.20 and VI.C.21 indicate that the number of new housing units built still would exceed the number of additional units needed to accommodate additional households in San Francisco because of Project Area employment growth.

The rate of housing construction would more than keep pace with the number of units required for Project Area office development under the OAHPP. The OAHPP requirement for affordable housing would be met if an amount of new units equivalent to about 9% of total new units built by 2000 were available to moderate- or low-income households.

The number of housing units built in the Project Area by 2000 would exceed the number of units needed to accommodate total Project Area employment growth (office and other) by that time. The number of affordable units built also would exceed the need for additional units in that price range. Nevertheless, during interim years as at build-out, some households with Project Area workers would have incomes below the levels needed to pay for the affordable new units to be developed in Mission Bay.

Initial Phase of Development. The initial phase of development is included in interim estimates of employment growth and housing development for 2000. However, compared to 2000, the initial phase for Alternative B would include proportionally more employment growth than housing development. Thus, housing demand related to Project Area employment growth would account for a larger percentage of new housing built in the initial phase than would be the case for development by 2000. However, the number of new housing units built still would exceed the number of additional units needed to accommodate Project Area employment growth.

Alternative N. Since Alternative N does not include housing development in the Project Area, consideration of phasing focuses on the rate of employment growth.

Tables VI.C.20 and VI.C.21 provide estimates of the OAHPP requirements and of additional San Francisco households with Project Area workers by 2000. The additional households associated with Project Area employment growth would have to be accommodated by housing added elsewhere in the City outside the Project Area.

IMPLICATIONS FOR CITYWIDE HOUSING MARKET CONDITIONS

2000

Citywide housing market implications of Mission Bay Alternatives are based on the Alternatives' contributions to housing demand (through commercial and industrial development and employment growth) and to housing supply (through residential development). Overall, the Alternatives would not result in large differences in housing market conditions in the City. There would be some differences in the degree of certain effects, and there would be differences for certain segments of the market. Since the Alternatives themselves and their cumulative scenarios for employment and housing would not be very different in 2000, the differences in citywide housing market conditions that eventually could be attributed to different Mission Bay development programs would not be evident in 2000. As they were built out, the Mission Bay Alternatives would affect the City's housing market gradually. The full implications of one Alternative compared to another would be evident only over the long term; they are described below under the heading Build-Out/2020.

Initial Phase of Development

In the initial phase of Mission Bay development under Alternatives A and B there would be no noticeable impacts of Project Area development on the citywide housing market.

Build-Out/2020

Mission Bay One of Many Factors Affecting Future Citywide Housing Market Conditions

Mission Bay Alternatives would affect both the demand and supply sides of the City's housing market in the future. The Alternatives would affect employment growth (demand) and housing development (supply) in the City. The preceding discussion compares the Alternatives from the perspective of jobs and housing in the Project Area (see pp. VI.C.67-VI.C.81). For analysis of the Alternatives' implications for citywide housing market conditions, a broader cumulative perspective is required.

From that perspective, differences between the Alternatives are narrower than they are in the Project Area scenarios. That is because, on a citywide basis, the differences between Alternatives in demand and supply (i.e., employment growth and housing production) are not as great as they are on a Project Area basis. The primary reason is that some employment growth is forecast to occur elsewhere in the City if not accommodated in Mission Bay. In other words, some of the demand for housing related to employment growth would still be a factor in the City's housing market even if that growth were not located in the Project Area.

Moreover, from the citywide perspective, Mission Bay employment and housing would be relatively small parts of the bigger picture of cumulative employment growth, housing development and other factors influencing citywide housing market conditions. The first section of this chapter describes housing market conditions in San Francisco and factors that contribute to high housing prices and rents in the Bay Area and San Francisco in particular (see pp. VI.C.1-VI.C.6). Strong demand for housing, such as that attributable to economic expansion and employment growth, is a contributing factor. Other demand factors affecting housing market conditions include: age distribution of the population, household sizes and incomes, mobility and migration, and lifestyle preferences. Supply factors include: land availability, local land use policies, construction costs, and the existing supply of housing. General economic conditions affecting housing finance also are important.

Although Mission Bay Alternatives would have different implications for citywide housing market conditions in the future as a consequence of their different contributions to demand and supply, it is unlikely that there would be large differences in overall housing market conditions in the City under one Alternative compared to another. The combination of demand and supply factors in addition to Mission Bay development will determine the overall availability and price/rent range for housing in the City in the future. Those demand and supply factors would apply in all future scenarios for San Francisco, regardless of the Mission Bay Alternative. The choice of an Alternative would make some difference, depending on the implications for demand and supply, but overall conditions are not expected to be much changed from those of the mid-1980s, because of the greater influence of factors independent of development in the Mission Bay Project Area.

Implications of Cumulative Growth for Future Housing Market Conditions

The following summary describes the interaction of demand and supply factors in San Francisco and highlights the expected future housing market situation based on those factors. The differences between Alternatives, primarily in certain submarkets or locations, are described following the overview of the basic housing market scenario.

- Over time, with economic and employment growth, people will continue to want to live in San Francisco. Some will pay more for housing in the City than they would in an outlying location because they save on time and costs of commuting. There also will be households (both new and existing) with more income to pay for housing. Those factors will add to otherwise strong demand for housing in the City.

- At the same time, additional housing will be produced in San Francisco. The net addition of housing will be greater on an average annual basis in the future than in the past.

- San Francisco is unlikely to accommodate all households that otherwise would choose to live in the City, however, due to the City's role as employment center for a large region and the relatively limited land available in San Francisco, compared to other parts of the region. Moreover, the private sector is expected to continue to be unable to supply much new housing affordable to a large segment of the population. What many people can afford to pay does not cover development costs. The difficulties in producing affordable housing arise from many factors and exist throughout the region. It will continue to be more difficult to produce affordable housing in San Francisco because of the relatively higher costs for land and construction in the City compared to many other parts of the region.

- Given those conditions, housing prices and rents are expected to remain high relative to household incomes and to costs of other goods and services over the long term. Prices and rents for San Francisco housing are expected to remain high relative to those in many other parts of the region.

- There will continue to be strong demand for existing lower-cost housing, because of the on-going difficulty of providing new units at affordable price/rent levels. That will continue to put upward pressure on prices/rents of existing units. Occupancies will remain high (children living at home longer, more people living together, etc., and/or lower vacancies). There will continue to be pressures to upgrade existing housing.

- Those market pressures will continue to be greatest for older rental and for-sale units priced below the average for San Francisco housing. The relatively high level of prices/rents needed to generate new market-rate construction and demand for affordable housing combined with the large pool of consumers who would like to live in San Francisco's older housing will result in upgrading of lower-cost older housing. Often, lower-income residents (primarily renters) can be "priced out" of their housing in the upgrading process.

- High housing prices and rents will continue to have implications both for those in the housing market and for existing residents. Some people decide not to move into San Francisco, and some existing residents move out of the City for more acceptable housing elsewhere, given the price. Many continue to live in the City. Some pay more for the same quality housing, and others end up with lower quality housing; many allocate a large share of their resources for housing. People live together to share housing expenses, or more household members contribute to housing expenses. Owners of existing units benefit to the extent that the values of their properties increase.

- Generally, households with fewer financial resources available to pay for housing (low- and some moderate-income households) make the most sacrifices in these market conditions. They have less ability to compete for housing and fewer housing options. San Francisco is and will continue to be home to a large number of such people: renters, young people, those holding entry-level jobs, the elderly and others on fixed incomes, newly arrived immigrants, as well as other poor and unemployed people. It is more likely that many of those people will continue to live in the City, although in more crowded or less-adequate housing, than move out of San Francisco.

Comparison of Alternatives

The main difference between Alternatives is that Alternatives A and B combine both jobs and housing (demand and supply) in Mission Bay while Alternative N provides jobs but no housing (demand but no supply). On that basis, the City's housing market would be better off under Alternatives A and B than it would under Alternative N. (Chapter VII. Variations on Alternatives, p. VII.1, discusses a housing variant of Alternative N.)

As mentioned above, the basic housing market scenario just described would be expected to apply under all Alternatives. The magnitude of the supply/demand differences between Alternatives on a citywide basis would not make large differences in overall housing market conditions. There would be more differences in certain segments of the market, however, than in overall market conditions.

Most of the effects of the Alternatives on housing market conditions in San Francisco would be evident in the middle range of the market, not among more expensive housing and not among the lowest-priced housing. Mission Bay would make the most difference in the housing market by providing subsidized units and units priced just above the threshold price required to develop market-rate housing. That housing will continue to be in strong demand and will be difficult to produce elsewhere in the City because of constraints such as zoning, allowable residential density, land costs, and other costs. The supply in Mission Bay would accommodate households whose other housing options would include existing housing as well as those who otherwise would not be able to live in the City. Housing in Mission Bay would relieve some of the demand pressures that lead to gentrification in existing neighborhoods and the associated implications for long-time residents of those neighborhoods. Mission Bay housing would not affect directly the low end of the housing market. The large subsidies needed to provide housing for low-income households are not proposed for the Mission Bay Alternatives.

Alternative A. Alternative A would add employment and housing in the City. In terms of citywide housing demand associated with Mission Bay employment growth, Alternative A would result in the most, compared to the other Alternatives. In terms of housing supply, Alternative A would add a substantial amount compared to Alternative N but not as much as Alternative B. Consequently, with respect to the City's housing market, Alternative A would result in better conditions than Alternative N but worse conditions than Alternative B.

Compared to Alternative N, Alternative A would relieve some of the demand pressures on existing housing in the City primarily because of housing in the affordable and middle-level price ranges that would be provided in the Project Area. In general, all newer housing in the Downtown & Vicinity might be somewhat lower in price under Alternative A than under Alternative N because of the large addition to the housing supply provided by the Mission Bay units. Generally, affordable units in Mission Bay under Alternative A could only be produced in the City with the benefit of the development program agreed upon for Mission Bay. Consequently, Alternative A would provide housing opportunities in the City for some of those who make the most adjustments and sacrifices under the housing market conditions expected to prevail in San Francisco over the long term.

Alternative A's effects on segments of the City's housing market would be similar to those of Alternative B, but not as pronounced. That is because Alternative B would add more to housing supply in the City and, at the same time, would add relatively less to housing demand.

Alternative B. Like Alternative A, Alternative B would add employment and housing in the City. In terms of citywide housing demand associated with Mission Bay employment growth, Alternative B would result in the least, compared to the other Alternatives. In terms of housing supply, Alternative B would add the most to the City's housing stock.

Consequently, Alternative B would result in better housing market conditions than would either of the other Alternatives.

Alternative B would relieve more of the demand pressures on existing housing, and newer housing in the Downtown & Vicinity might be somewhat lower in price than it would under either Alternative A or Alternative N due to the combination of less demand and more supply under Alternative B. Alternative B would provide more affordable housing opportunities in the City, made possible by large-scale residential development in Mission Bay, than would Alternative A.

Alternative N. Alternative N would add a substantial amount of employment in the City (more than Alternative B but less than Alternative A) and no housing. Alternative N would result in somewhat less housing demand associated with Project Area employment growth than Alternative A but more than Alternative B. Alternative N would make no contribution to expanding the City's supply of housing. There would be more infill development in western parts of the City under Alternative N to substitute for housing that would be produced in Mission Bay under the other Alternatives. From a citywide housing market perspective, Alternative N would result in worse conditions than either of the other Alternatives. Conditions would be worse because, under Alternative N, there would be increased demand with no additional supply to offset some of that demand. There would be more households competing for other new units in the City, bidding up prices on those units. There also would be more demand pressure on the existing stock relative to the other Alternatives. Finally, under Alternative N, the City would forgo the opportunities it would have under Alternatives A and B to provide affordable housing.

IMPLICATIONS FOR NEARBY AREAS

Mission Bay development could affect the future character of nearby residential areas: South of Market, Lower Potrero / Central Bayfront, Potrero Hill (combined with the Lower Potrero / Central Bayfront area for this discussion), and the Inner Mission and South Bayshore areas. (See Figure IV.2, p. IV.6, for a map of the Nearby Areas.) The types of effects and the degree of impacts would vary between Alternatives.

As in the case of business activity and employment in Nearby Areas (see p. VI.B.106), development of Mission Bay under any of the Alternatives would represent an upgrading of the land use character of that part of the City. There would be differences between Alternatives depending on the type of neighborhood into which each developed. The overall land use character of each Alternative would affect the image of Nearby Areas as well. In the case of residential uses, Alternatives A and B, both with substantial amounts of new housing in Mission Bay, would do more to increase the acceptability of residential areas in the vicinity of Mission Bay than would Alternative N. There also would be differences between Alternatives as a consequence of the amounts of new housing provided in the Project Area. Since there would be strong demand for housing in the City, new housing in Mission Bay would absorb some of the demand that otherwise would result in higher prices/rents for existing stock and further change in older neighborhoods.

2000

By 2000, the Mission Bay Alternatives would not have much effect on households and population in nearby residential areas. The areas will be changing over time, however, independent of Mission Bay development. In fact, new housing and new population in the eastern South of Market area by 2000 would be greater than new housing and population in Mission Bay under Alternatives A and B by that time. New South of Market housing would have a bigger impact on the residential character of that area than would new Mission Bay housing by 2000.

In Alternative N, with no new housing development in Mission Bay, new housing development South of Market probably would proceed at a faster pace than it would under Alternatives A and B. That is because some of the new Mission Bay housing under those Alternatives would be similar in character and market orientation to housing developed in South Beach, Rincon Hill and Yerba Buena Center. Without competition from Mission Bay (the case under Alternative N), South of Market housing would be absorbed more quickly.

In other Nearby Areas, housing would be changing hands and the demographic characteristics of the neighborhoods would be evolving, but by 2000 those changes would not be attributable directly to Mission Bay. There is nothing in particular about the locations of development by 2000 in the various Alternatives that would affect specific residential neighborhoods early in the development process. There would be less impact on nearby residential areas than on adjacent commercial/industrial areas since the latter would share boundaries with the Project Area. Adjacent commercial/industrial areas consequently serve as buffers between Mission Bay and nearby residential areas.

Under all Alternatives, the process of upgrading property in Mission Bay and in the vicinity of the Project Area, enhancing its appeal to higher rent-paying commercial uses and higher-income households, would be underway by 2000. As in the case of business activity and employment, expectations of future changes would influence demand for housing in areas near Mission Bay as well as the decisions of property owners. Such effects due to Mission Bay development would not be widespread by 2000, however.

Initial Phase of Development

During the initial phase of Mission Bay development under Alternatives A or B there would be no particular implications for housing and population in nearby residential areas. The overall points made above for development through the year 2000 apply, in a more limited way, to the initial phase of Mission Bay development.

Build-Out/2020

South of Market

Over the long term, large amounts of new residential development in the eastern South of Market area and in Mission Bay under Alternatives A and B would change the overall character of what has long been considered an older commercial/industrial area on the periphery of downtown. While other uses would continue in the large South of Market area and businesses would continue to operate and expand (see VI.B. Land Use, Business Activity and Employment, p. VI.B.109), residential development and the new neighborhoods and population that follow would be major influences on South of Market character and activity in the future.

The South of Market area would continue to house a range of types of households and people. Elderly housing would continue to be an important component of the housing stock and could be expanded as demographic trends supported increasing demand for congregate elderly housing. The other new housing developed South of Market, as in Mission Bay, would include a mix of types of units, some with price/rent subsidies, to accommodate a range of household sizes and incomes. While there could be pressure on existing low-cost housing in the western South of Market area as residential neighborhoods to the east became more established and new residential development South of Market became more acceptable, some older residential enclaves could be retained as low-cost housing. The City's proposed South of Market Plan supports preservation of those areas.

It is difficult to predict the effects of the Alternatives, since there are features of each that have offsetting implications. The following discussion for each Alternative points out the factors that would influence housing and population South of Market.

Alternative A. The new residential neighborhood in Mission Bay under Alternative A would reinforce and support the development of new residential neighborhoods in Rincon Hill, South Beach and Yerba Buena Center. Those developments themselves would have more implications for the future residential character of South of Market than would Mission Bay residential development. With so much new housing, including that in Mission Bay, parts of South of Market would become established and desirable residential neighborhoods. The new housing would attract a different mix of households and population from that currently in the area. There would be more young households with workers, more families and more two-worker households without children, for example. In general, household incomes would be higher than the current average for the area due to that new mix of types of households. Households with lower incomes would continue to live in older housing South of Market.

The result could be pressure to upgrade low-cost housing in the western South of Market area, thus reducing housing options in San Francisco for low-income families, recent immigrants, the elderly, etc. On the other hand, the large amount of new housing elsewhere South of Market and in Mission Bay under Alternative A would accommodate demand for housing in the Downtown & Vicinity, thus reducing pressure somewhat on older housing in the area. To the extent that overall housing market conditions in the City would be better with Mission Bay development under Alternative A compared to Alternative N (see p. VI.C.85), there could be somewhat less pressure on prices/rents for housing South of Market.

Alternative B. In general, the types of effects of Alternative B would be similar to those of Alternative A. In combination with other new housing developed in the eastern South of Market area, the large amount of housing in Mission Bay under Alternative B (in particular that developed in blocks north of the Channel) would firmly establish the area as a predominantly residential part of the City in the future. The larger amount of new housing in Mission Bay under Alternative B would accommodate even more demand for housing in the Downtown & Vicinity compared to Alternative A. There could be somewhat less pressure on prices/rents for housing South of Market, as a result.

Alternative N. New South of Market housing would be built under Alternative N, although no new housing would be built in Mission Bay. Consequently, there would be changes in households, population and the residential character of the area, even without new Mission Bay housing. Mission Bay under Alternative N would not contribute to establishing South of Market as a new residential neighborhood, however. On the other hand, since Alternative N would not accommodate any of the demand for housing in the Downtown & Vicinity, there could be more demand pressure on South of Market housing than under the other Alternatives. The result could be relatively higher prices/rents for both existing and new South of Market housing over the long term, than there would be with Alternatives A or B.

Lower Potrero / Potrero Hill

Unlike South of Market, Lower Potrero / Potrero Hill does not have, under current zoning, opportunities to add large amounts of new housing and population in the future. There will be small infill projects, but most of the change in households and population in the future will reflect changes in existing housing stock. Established trends are expected to continue, given the strong demand for housing in the City, regardless of development in Mission Bay. The close-in areas of Lower Potrero and Potrero Hill in particular will see property values continue to increase as more affluent households, many with two workers, are attracted to those neighborhoods near, but not part of, the Downtown & Vicinity.

Mission Bay development would accentuate those trends by upgrading both the image of the area and opportunities available in the vicinity. There could be more implications from Mission Bay development for those nearby residential areas than there would be for the South of Market area. As with South of Market, however, the effects of the Alternatives are difficult to predict due to factors that have offsetting implications.

Alternative A. Mission Bay under Alternative A would influence the future character of the Lower Potrero and Potrero Hill residential neighborhoods in several ways. Under Alternative A, Mission Bay itself would become a residential neighborhood, enhancing the appeal of that part of the City as a residential area. Potrero Hill no longer would be as isolated as it now appears. Mission Bay under Alternative A would offer amenities such as open space, community facilities and retail opportunities that would enhance the residential character of the area. Improved transit access to the Downtown & Vicinity via Mission Bay as well as the large number of job opportunities in the Project Area itself would make the area more attractive to households with workers. While such factors could be considered benefits to Lower Potrero / Potrero Hill, they also indicate the types of changes in character likely to occur in those communities over time. Those factors all would contribute to stronger demand for housing in Lower Potrero / Potrero Hill. Gentrification pressures could increase. However, to the extent Mission Bay under Alternative A would provide a large amount of new housing in the Downtown & Vicinity, it would accommodate some of the demand that otherwise would be felt as gentrification pressure in Lower Potrero / Potrero Hill.

Alternative B. In Alternative B, the types of effects on Lower Potrero / Potrero Hill would be similar to those in Alternative A. There are features of Alternative B, however, that could result in somewhat less pressure for change in those areas. Mission Bay under Alternative B would provide a complementary residential neighborhood, resident-serving amenities (open space, retail opportunities, community facilities), and improved transit access to the Downtown & Vicinity that would contribute to the attractions of Lower Potrero / Potrero Hill. In that sense, Alternative B would be similar to Alternative A. On the other hand, Alternative B would not provide as many job opportunities in the Project Area, and Alternative B would provide a larger amount of housing in the Project Area. Those factors would tend to result in less demand for housing and thus less pressure for change in neighborhood character in Lower Potrero / Potrero Hill compared to Alternative A. The differences would be small, however.

Alternative N. The effects of Alternative N on the nearby residential communities of Lower Potrero and Potrero Hill would be the opposite of the effects of Alternatives A and B. While Mission Bay development under Alternative N would improve and upgrade the image of the Project Area and its vicinity, the effects of that improvement would be evident in terms of business activity and employment instead of housing. With the exception of job opportunities, Mission Bay under Alternative N would not offer the degree of amenities or other features provided in Alternatives A and B (e.g., neighborhood retail, community facilities, open space, MUNI route extensions into the Project Area). Nevertheless, because Alternative N would provide no new housing in Mission Bay, and demand for housing near jobs in the Downtown & Vicinity would be strong, there would be demand for the existing housing in close-in areas. Because Lower Potrero / Potrero Hill would be one of the few options for housing near jobs in the Downtown & Vicinity under Alternative N, there could be more demand with somewhat higher housing prices/rents than under the other Alternatives.

More-Distant Residential Areas

Effects of Mission Bay development would not be felt to the same degree in the Inner Mission and South Bayshore residential areas as they would in the areas surrounding Mission Bay. There are likely to be changes in the character of the Inner Mission and South Bayshore neighborhoods over time, but the changes are not likely to be as great as those in South of Market or Lower Potrero / Potrero Hill. The changes would be less related to Mission Bay and would reflect plans and development programs in the neighborhoods themselves (Executive Park, long-term Navy plans for the shipyard site, Hunters Point redevelopment) as well as overall demographic trends in the City.

Job growth and transportation improvements under Alternatives A and B and job growth under Alternative N would bring jobs in the Downtown & Vicinity closer to residents of the Inner Mission and South Bayshore. Alternatives A and B would provide increased shopping and recreational opportunities for residents of the southeastern part of the City. Because they are relatively distant from the Project Area, the Inner Mission and South Bayshore would be unlikely to experience strong demand for housing in their neighborhoods attributable to the amenities and residential upgrading or to job growth and transportation improvements in the Project Area. In that respect, they would differ from the closer-in residential areas.

IMPLICATIONS FOR THE HOUSING MARKET IN THE REST OF THE REGION

Mission Bay, and the citywide cumulative context of which it would be a part, would contribute to regional housing market conditions in the future. The Alternatives would have different effects on demand for and supply of housing in the City. The mix of jobs and housing in Mission Bay would affect the number of San Francisco workers living in the City and the number of San Francisco workers who live elsewhere in the region and commute to jobs in the City. The analysis indicates, however, that given the size and diversity of the region, there are not likely to be large differences between Alternatives in overall future housing market conditions for the region outside of San Francisco. Moreover, over time, employment growth in the Downtown & Vicinity will become relatively less important as a factor in the region's housing market.

2000 and Build-Out/2020

Regional Perspective on Jobs and Housing in Mission Bay

San Francisco employment growth will contribute to regional housing demand as it has in the past, since not all San Francisco workers could be expected to or would choose to live in the City. In the large Mission Bay Project Area, there is the potential for adding to the City's housing supply so that San Francisco could house more of its own employment growth than otherwise. As a result, San Francisco employment growth would contribute less to housing demand outside the City than otherwise would be expected without Mission Bay housing. Of the three Mission Bay Alternatives, Alternatives A and B would provide substantial housing in the Project Area; Alternative N would provide no new housing. The Alternatives also differ in terms of employment and the associated demand for housing. Alternative A would result in the most; Alternative B the least; and Alternative N would fall within that range.

Considering the cumulative scenarios of both jobs and housing together, the result in terms of San Francisco's contributions to demand for housing in the rest of the region (number of San Francisco workers who live outside the City) would be about the same for Alternatives A and N. Compared to Alternative N, the larger amount of housing in Alternative A is offset by the larger number of jobs, thus leaving the number of jobs to be filled by residents of the rest of the region about the same as would be the case under Alternative N. Because Alternative B has relatively more housing compared to jobs in the City than the other two Alternatives, it would result in fewer City jobs filled by residents of the rest of the region. That means that San Francisco under Alternative B would contribute relatively less to housing demand in the rest of the region than it would under the other Alternatives.

Although the contribution of San Francisco employment growth to housing demand in the rest of the region would be relatively less with Alternative B than it would with the other Alternatives, the amount of housing demand associated with the cumulative scenario for total employment growth throughout the region would be about the same with all of the Alternatives. The cumulative analysis indicates that total regional economic activity would not differ much between the scenarios for each Alternative; the choice between Mission Bay Alternatives would have different implications for the distribution of business activity and employment growth throughout the region, however. (See VI.B. Land Use, Business Activity and Employment, pp. VI.B.119–VI.B.123, and VI.O. Growth Inducement, pp. VI.O.1–VI.O.2.)

Since the cumulative regional scenario for Alternative B would have relatively more business activity and employment growth dispersed among parts of the region outside San Francisco than would the scenarios for Alternatives A and N, there would be relatively more housing demand near those areas. There could be relatively more demand in outlying parts of the Bay Area and in communities beyond the nine-county region. Alternative N also would result in a somewhat more dispersed pattern for regional employment growth than would Alternative A. Therefore, the implications for housing demand from the cumulative regional perspective would fall somewhere in between those of the scenarios for Alternatives A and B. (VI.O. Growth Inducement, pp. VI.O.5–VI.O.6, describes the patterns of population growth associated with the different scenarios for regional employment growth.)

Thus, from the cumulative regional perspective, there would be differences between the Alternatives in the source of housing demand in the region, depending on where employment growth occurs. When San Francisco would contribute relatively less to demand, other parts of the region would contribute relatively more.

Contribution of Employment in the Downtown & Vicinity to Regional Housing Market

The differences between Mission Bay Alternatives identified above are reflected in cumulative scenarios for the Downtown & Vicinity associated with each Alternative. The share of the employed population from each part of the region that works in the Downtown & Vicinity is an indicator of how much of the demand for housing in an area might be associated with employment in the Downtown & Vicinity. Table VI.C.22 illustrates that relationship for 1981, 1985 and the future for each Alternative. The table presents a comparison of workers in the Downtown & Vicinity by place of residence (see Table VI.C.15, p. VI.C.58, and Table VI.C.16, p. VI.C.61) to total employed population in each place of residence (see Table VI.C.10, p. VI.C.45, and Table VI.C.12, p. VI.C.50). The comparison is expressed as a percentage (people working in the Downtown & Vicinity and living in a particular area as a percent of all workers, i.e., employed population, living in that area) to illustrate the degree to which people working in the Downtown & Vicinity occupy housing in each area and, thus, the extent to which they affect housing market conditions separate from all other workers choosing to live in the area.

TABLE VI.C.22: WORKERS IN THE DOWNTOWN & VICINITY BY PLACE OF RESIDENCE AS A PERCENT OF EMPLOYED POPULATION IN EACH PLACE, 1981, 1985, 2000, AND BUILD-OUT/2020

			Scenario for Alternative A		Scenario for Alternative B		Scenario for Alternative N	
Place of Residence	1981/a/	1985/a/	2000/b/	2020/b/	2000/b/	2020/b/	2000/b/	2020/b/
San Francisco	55.8%	52.9%	54.5%	57.2%	54.0%	56.4%	54.4%	57.4%
East Bay	9.0%	7.3%	8.8%	8.7%	8.7%	8.4%	8.7%	8.7%
South Bay	4.5%	3.8%	4.3%	4.6%	4.2%	4.3%	4.2%	4.6%
North Bay	10.1%	8.2%	8.8%	9.1%	8.7%	8.5%	8.7%	9.1%
TOTAL REGION	13.7%	12.0%	12.2%	12.4%	12.1%	12.0%	12.2%	12.3%

NOTE: This table presents estimates for both 1981 and 1985 for two reasons. One is that 1981 estimates provide the starting point for much of the housing and population analysis because Census data are available for 1980 and the C-3 District Employer/Employee Surveys were done in 1981. The other reason is that the change from 1981 to 1985 is not considered to be typical of long-term trends, so that providing information for both years offers a better basis for comparison when considering forecasts and analyses for future years.

The percentages in the table are derived by dividing the estimate of people working in the Downtown & Vicinity and living in each place by the total workers living there (employed population). The numbers on which the percentages are based are presented elsewhere in the EIR, as identified in the footnotes.

/a/ See Table VI.C.6, p. VI.C.30.
/b/ See Table VI.C.16, p. VI.C.61, Table VI.C.11, p. VI.C.47, and Table VI.C.12, p. VI.C.50.

SOURCE: Recht Hausrath & Associates

As employment in the Downtown & Vicinity increases in the future, so will the employed population living in the City and elsewhere in the region. By build-out/2020, with all Alternatives, San Franciscans working in the Downtown & Vicinity will represent a larger share of the employed population of the City than in earlier years. In the future, the larger number of people working in the Downtown & Vicinity will represent about the same or somewhat smaller percentages of the growing employed population in other parts of the region with all Alternatives. Thus, in the future, people working in the Downtown & Vicinity will not require larger shares of the region's housing than they did in the early 1980s (using 1981 as the benchmark in this case, because of the short-term anomaly indicated in the 1985 comparison).

There would not be much difference between Mission Bay Alternatives, considering all other employment growth and housing production as well as other demand and supply factors incorporated in the cumulative scenarios. With Alternative B, people working in the Downtown & Vicinity would represent a somewhat lower percentage of the employed population in other parts of the region than they would with Alternatives A and N. In 2020, the difference in that one factor is not expected to result in a large difference in the regional housing market, however.

There are many factors affecting regional housing market conditions. Demand for housing will continue to be strong relative to supply, and housing prices/ rents will continue to be high relative to household incomes.

As part of total regional employment growth in the future, employment growth in the Downtown & Vicinity contributes to regional housing demand. A strong regional economy has and will continue to be a factor contributing to a regional housing market with relatively high housing prices and rents. By itself, growth in the Downtown & Vicinity will make only a small difference in the region's housing market outside of San Francisco. The cumulative analysis indicates that the importance of employment in the Downtown & Vicinity as one of the factors affecting housing demand will decline over time (as illustrated in Table VI.C.22, p. VI.C.95).

All other things being equal, regional employment growth will mean higher prices and rents for housing than otherwise would be the case in the future. It also will mean lower housing services (less acceptable housing conditions at the same, or higher, price) for some of the region's households. How much difference there will be (higher prices/rents or lower services) depends on other housing market factors besides employment growth (interest rates, land use policies, other demand factors, etc.). It also depends on the amount of employment growth. Employment growth in the Downtown & Vicinity alone will have much less impact than total regional growth.

Generally, employment in the Downtown & Vicinity plays a more important role in the housing market in communities near San Francisco: in San Mateo, Marin, Alameda, and Contra Costa Counties. Those counties currently house the most workers in the Downtown & Vicinity living outside San Francisco and are expected to house the majority of the additional workers in the Downtown & Vicinity living outside San Francisco in the future. The percentage of the employed population represented by people working in the Downtown & Vicinity and living in those counties could increase somewhat over time, by contrast to the overall pattern illustrated in Table VI.C.22, p. VI.C.95. Thus, demand associated with workers in the Downtown & Vicinity could become relatively more important to the housing markets in some close-in communities. Those communities are similar to San Francisco in terms of neighborhood characteristics and the quality of housing, so they are most likely to be considered by worker households that also would like to live in San Francisco.

There would be variation in effects on communities in the East Bay in particular. There would be more effects in the western parts of the East Bay and east of the hills along BART corridors. Because of the greater potential for expanding the housing supply in eastern parts of the East Bay, effects in communities on the west side of the hills would be more likely to be evident in terms of changes in existing housing stock and characteristics of the population.

Impacts on housing and population in close-in communities are likely to focus on older neighborhoods that offer housing at prices/rents below average levels but not at the lowest levels. The housing stock in such neighborhoods is susceptible to gentrification. Employment growth contributes to that phenomenon although there are other important factors. In recent years, increasing preferences for central city neighborhoods and older housing, an increase in the types of households with those preferences, and increasing incomes have been contributing factors. While such upgrading provides housing for one group of consumers it decreases the stock of lower-priced, more affordable housing for those with relatively lower incomes. Generally, it is the lower-priced stock that is most difficult to replace, and the households with relatively lower incomes who have the most difficulty paying for housing.

MITIGATION

Environmental impacts that would result from growth in housing supply in the Project Area with Alternatives A and B are related to the activities of the people who would occupy the housing. Residents would require various community services and use energy, for example. Mitigation measures for such housing-related environmental impacts are identified in the corresponding sections of the EIR. Therefore, no measures are identified for this section.

NOTES

SETTING

/1/ Federal Home Loan Bank of San Francisco, Housing Vacancy Survey: San Francisco County, Survey Date September 1986, Publication Date March 1987. U.S. Census and California Department of Finance data presented elsewhere in this chapter imply higher residential vacancy rates than indicated in the Federal Home Loan Bank Survey. The Federal Home Loan Bank Survey is used in this discussion of housing market conditions to illustrate trends over time and to compare conditions among areas of the region because it is a consistent series and the best public source of vacancy data available between Census counts.

/2/ Contract rent is the monthly rent agreed to, or contracted for, regardless of any furnishings, utilities or services that may be included. For vacant units, it is the rent asked for the unit at the time of the Census count.

/3/ U.S. Department of Commerce, 1970 Census of Population and Housing: Census Tracts, San Francisco-Oakland, Calif., Standard Metropolitan Statistical Area, Table H-1, and 1980 Census of Population and Housing: Census Tracts, San Francisco-Oakland, Calif., Standard Metropolitan Statistical Area, Table H-1.

/4/ Bay Area Council, Bay Area Housing Briefs, Volume 5, Number 12, December 1986 and Volume 6, Number 5, May 1987.

/5/ Real Estate Research Council of Northern California, Northern California Real Estate Report: Market Trend - October 1986, Single Family Residences, Volume 38, Number 2, February 1987.

/6/ Some of the change from 1980 to 1985 is not an actual increase but instead reflects an adjustment for undocumented aliens who entered California after the April 1980 Census; this group is not accounted for in the 1980 data.

/7/ Both U.S. Census data and California Department of Finance (DOF) estimates result in higher residential vacancy rates than does the survey conducted by the Federal Home Loan Bank referenced earlier on p. VI.C.5. In 1980, the Census vacancy rate for San Francisco was 5.5%. The vacancy rate estimated by the DOF for 1985 is 3.9%. Federal Home Loan Bank survey data for this period show vacancy rates in the range of 1%. Although Federal Home Loan Bank vacancy estimates may undercount vacant units, the annual survey methodology is consistent over time and provides the best public source of vacancy data between Census counts.

/8/ According to the U.S. Census, a family consists of a householder and one or more other persons living in the same household who are related to the householder by birth, marriage, or adoption. Examples of family households include a married couple with children, a single parent with children, and a married couple without children. Households composed of a group of unrelated persons or one person living alone are not families and can be grouped as non-family households.

/9/ See Figure IV.1, p. IV.5, for a map of the Downtown & Vicinity.

/10/ Calculation of the factor for household size (persons per household) uses population in households, not total population, as the numerator. (Total population, as defined by the U.S. Bureau of the Census, is the sum of population living in households and population living in group quarters.) People living in group quarters are excluded from the calculation of the descriptive factor for household size, since those people are not living in separate households (i.e., occupied housing units). The persons-per-household factor used in the EIR is the same as that defined by the U.S. Census and used by other data sources such as the California Department of Finance.

/11/ The information in this section is based on a survey of members of the Mission Creek Harbor Association conducted by Recht Hausrath & Associates in February and March, 1986. The information on the houseboat residents was obtained from a mail-out/mail-back questionnaire distributed to each household. Appendix C. Housing and Population, p. XIV.C.2, describes the survey administration and the scope of questions asked.

/12/ Olmsted, Nancy, Vanished Waters: A History of San Francisco's Mission Bay, Mission Creek Conservancy, San Francisco, California, 1986, p. 63.

/13/ Until early 1986, a shantytown that housed more than a dozen people had become established west of the channel, on public land just outside the Mission Bay Project Area, near the intersection of Seventh and Berry Streets. The residents were evicted and most were relocated to Tenderloin residential hotels. The shantytown was demolished in January 1986.

/14/ The description of population and households and of housing stock in the nearby residential areas is based primarily on analysis of Census data. The most recent data available are from the 1980 Census. Comparisons to 1970 Census data were done to illustrate trends, and comparisons to citywide totals were made to provide a basis for identifying the particular characteristics of these neighborhoods in a citywide context.

/15/ Olmsted, Vanished Waters, p. 47 and gazetteer at end of book (no page number).

/16/ San Francisco Department of City Planning, Central Waterfront Plan, 1980, p. 12.

/17/ San Francisco Redevelopment Agency, San Francisco Redevelopment Program Fact Book: 1985, pp. 51-57.

/18/ The residence patterns in Table VI.C.6 are presented for both 1981 and 1985 for two reasons. One is that the 1980/81 figures provide the starting point or true setting for much of the housing and population analyses, and some of the data used in the analyses are only available for these years (such as U.S. Census data and data from the C-3 District Employer/Employee Surveys done for the Downtown Plan EIR). Another reason is that the change from 1981 to 1985 is not considered typical of long-term trends. By providing information for both years, forecasts and analyses of future conditions presented later in this EIR can be compared to earlier conditions at both points in time.

/19/ Table VI.C.6 shows that City residents working in the Downtown & Vicinity in 1985 represented 52.9% of total employed residents of San Francisco. Table VI.C.5 shows that 82.2% of the employed residents of the City worked in San Francisco. The difference, or 29.3% of the employed residents, is the number employed in the rest of the City outside the Downtown & Vicinity. The same information is shown in Table VI.B.16, p. VI.B.47.

/20/ Information about the places of work of residents of the Downtown & Vicinity is from the following sources: 1980 Census; the survey of residents of newer downtown housing conducted by Recht Hausrath & Associates in 1986 for this EIR (see Appendix C. Housing and Population, pp. XIV.C.4-XIV.C.7, for a description of the survey); and data from 1980 Metropolitan Transportation Commission trip tables summarized by Barton-Aschman Associates, Inc., for this EIR.

FUTURE CONTEXT

/21/ The forecasts used to define the future context are long-term forecasts developed for certain benchmark years (2000 and 2020). Such forecasts reflect long-term patterns of change and are not sensitive to short-term conditions. With respect to the housing market, cyclical swings in interest rates and construction levels are not predicted and are assumed to average out over the long run.

/22/ The underlying scenario of an average of 1,000 housing units added per year is reasonable given the City's commitment to increasing housing production in the City (primarily through re-zoning and Redevelopment Agency efforts). Those efforts (and a decline in the rate of demolition) boosted housing production in San Francisco in the 1980's. Since 1980, slightly more than 1,000 units on average have been added each year in the City (see Table XIV.C.1, p. XIV.C.2). Recent City data show net additions of 1,334 units and 1,463 units in 1985 and 1986, respectively. San Francisco Department of City Planning, Housing Information Series: Changes in the San Francisco Housing Inventory, reports for 1985 (August 1986) and 1986 (June 1987).

The 1,500 units of housing at Hunters Point are a component of long-range Navy planning for the shipyard site and are independent of the homeporting of the U.S.S. Missouri in San Francisco Bay. If this housing were not built, there would be no measurable difference in the cumulative housing analyses in this EIR.

/23/ The forecasts of households in Table VI.C.9 reflect a 3.9% vacancy rate overall for housing in the City and a somewhat lower rate (3.4%-3.6%, depending on the Alternative) for housing in the Downtown & Vicinity. That differential (somewhat lower housing vacancy in the Downtown & Vicinity compared to the total City) is consistent with patterns identified in the 1980 Census.

The housing vacancy rate that is assumed to remain relatively constant over time is that estimated by the California Department of Finance (DOF) for 1985. That rate is consistent with the housing vacancy rate in 1980 Census data. It is higher than the annual estimate provided by the Federal Home Loan Bank Housing Vacancy Survey, but is believed to be closer to what future Census counts might indicate. (See note /7/.)

/24/ California Department of Finance, "Projected Total Population of California Counties: July 1, 1985 to July 1, 2020," Report 86 P-1, December 1986.

IMPACT

/25/ As outlined in the 1984 Mayor's Letter to Southern Pacific prices for affordable units could range from $105,000 - $150,000 (1984 dollars), with an average price of $125,000. Some of the affordable units would be available at comparable affordable rents.

/26/ The Office Affordable Housing Production Program (OAHPP) was established by Ordinance of the City and County of San Francisco (Ordinance #358-85), effective July 19, 1985, and now contained in Section 313 of the City Planning Code.

/27/ See Recht Hausrath & Associates, "Summary of the Economic Basis for an Office-Housing Production Program," July 19, 1984. The report, prepared for the Department of City Planning, summarizes the relationship between employment growth and the housing market and the approach used to develop the economic rationale for the OAHPP.

/28/ The relationships used to develop estimates of additional San Francisco households with Project Area workers are derived from the cumulative future context over the entire analysis period through build-out/2020. Because of the availability of Census data for 1980 and downtown survey data for 1981, ratios of changes over time reflect the forecasts from 1980/81 through 2020. Separate ratios were not developed for the interim (1980/81-2000) and long term (2001-build-out/2020) analysis periods. For example, ratios used to estimate additional San Francisco households with Project Area workers combine the forecast that the average number of workers per household in San Francisco would increase from 1980 through 2000 and the forecast that that ratio will stabilize thereafter (through 2020) because of the aging of the population, as discussed in the description of future context earlier in this chapter.

/29/ The income information used for the analysis reflects household income. Household income includes wages and salaries of all workers in the household and other income, such as interest, income from other investments, or pensions for retired persons in the household. The estimates do not reflect only wage and salary income for Project Area workers (except for households with only one worker and no other income besides wages and salaries).

/30/ The categories used in federal housing subsidy programs by the U.S. Department of Housing and Urban Development (HUD) further highlight the fact that a large segment of the population cannot afford new housing. These categories group households according to median incomes for households of various sizes. By definition, median income is the income "in the middle": half the households have incomes below the median and half have incomes above it. Households are categorized as having very low income (below 50% of median income); low income (50% to 80% of median); moderate income (80% to 120% of median); and middle income (120% to 150% of median). Generally, market-rate housing cannot be produced without subsidies for very low-, low-, and moderate-income households. Often, market-rate housing cannot be produced feasibly for middle-income households, as well. Thus, the majority of all households do not have incomes high enough to afford new market-rate housing (those with incomes of up to 120%-150% of median income, depending on household size and market context).

/31/ As explained in Appendix C. Housing and Population, pp. XIV.C.34-XIV.C.37, data on household income distributions are from 1981 C-3 District and 1982 South of Market/Folsom Employer and Employee Surveys, updated to 1984 dollars. The year 1984 is used for comparability with housing price assumptions for Mission Bay from the Mayor's Letter.

/32/ The 1986 Mission Bay Special Study dealing with housing mix and finance identifies alternative housing programs that would produce 30% affordable housing at various average prices. The alternative that yields the average of $125,000 would have 12%

of the units priced for moderate-income households and 18% for middle-income households. The 12% for moderate-income households is very similar to the 12.7% OAHPP requirement for Alternative A. See San Francisco Department of City Planning, "Housing Mix/Finance/Building Prototypes, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Gabriel-Roche, Inc. and Daniel Soloman and Associates, September 1986, p. 10.

/33/ In addition to the office development in Alternative N, it is assumed that a portion of the new space developed under M-2 Industrial zoning would be occupied by office uses and subject to OAHPP requirements. However, it is uncertain how much of the new M-2 Industrial space would be office and would be 50,000 square feet or more. (Projects under 50,000 square feet are exempt from OAHPP requirements.) For purposes of the EIR, it is assumed that 10% of the M-2 Industrial space, or 500,000 square feet, would be subject to OAHPP requirements. The actual amount could be more or less than that estimate. It is assumed that Port-related M-2 would not include office development subject to OAHPP requirements.

/34/ As a consequence of that assumption, the analysis overestimates the year 2000 demand. Through 2000, proportionally more of the increase in employed residents would be due to increases in labor force participation and a greater number of workers-per-household in existing housing than is expected after that time. (Those forecasts are discussed in the Future Context section, p. VI.C.41). Thus, since relatively more of the additional workers would be accounted for by such changes, proportionally fewer additional households would be needed to accommodate additional workers through 2000 than would be needed thereafter. Nevertheless, the estimates in Table VI.C.21, p. VI.C.79, indicate how employment growth and housing development would compare in interim years relative to the comparisons described above for the Alternatives at full development.

D. COMMUNITY SERVICES AND INFRASTRUCTURE

SETTING

Community Services and Infrastructure describes services provided by the City of San Francisco, including Fire Protection, Police Protection, Schools, Recreation and Parks, Libraries, Public Health, Water Supply, Sewers and Wastewater Treatment, Solid Waste Disposal, and Streets. (School services are under the jurisdiction of the San Francisco Unified School District, and solid wastes services are franchised to private scavenger companies.)

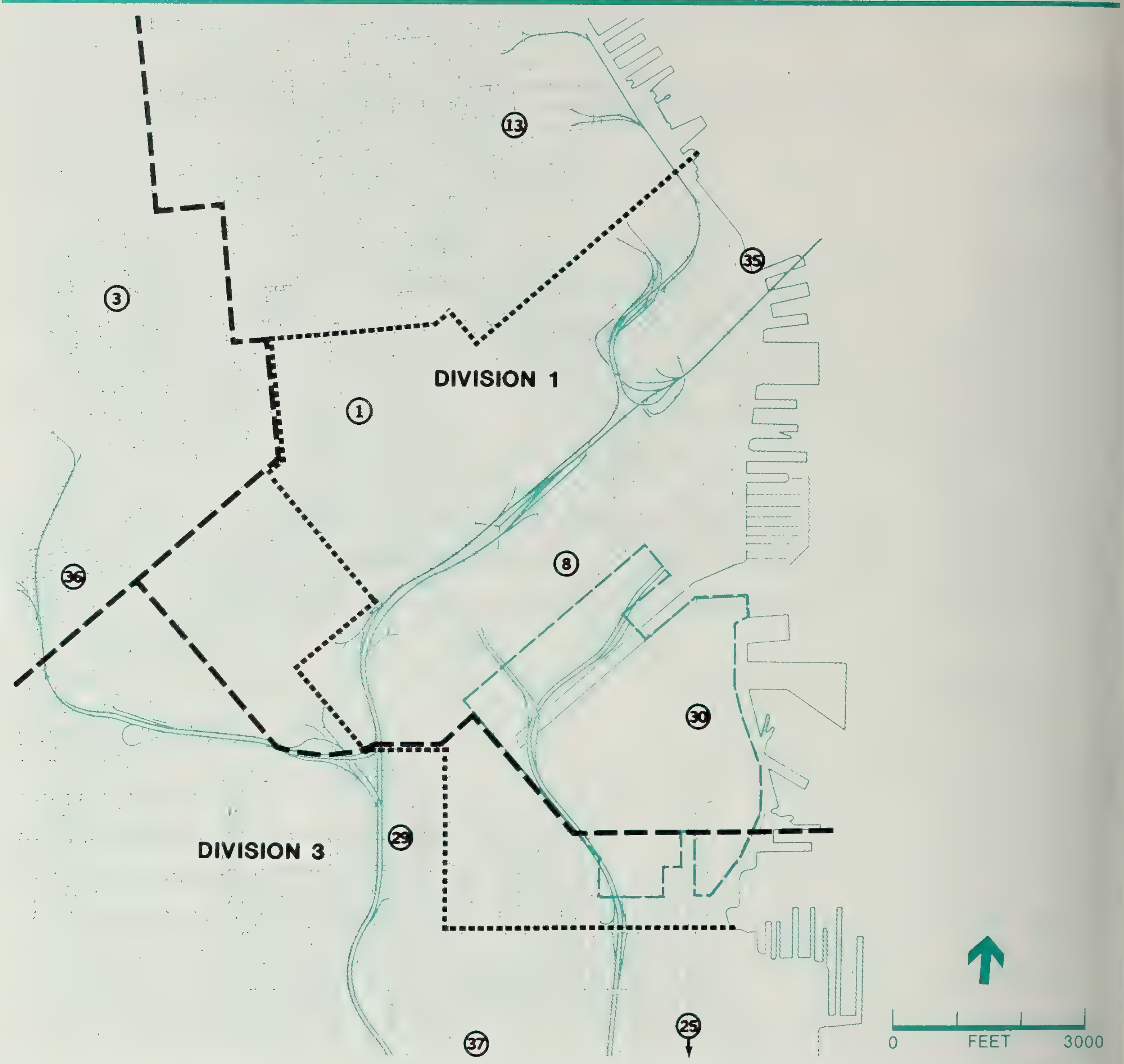
Existing service requirements and facilities in Mission Bay, and general citywide issues are discussed for each service in the Setting section. The Setting is followed by analysis of the Impact of the Alternatives on each service, beginning on p. VI.D.32.

FIRE PROTECTION/1/

Citywide and Mission Bay Service

The San Francisco Fire Department provides fire protection to the Mission Bay Project Area including docks and China Basin Channel. The Port of San Francisco Fire Marshal conducts pier inspections and investigates fires, hazardous material incidents and other emergencies occurring on Port property. The U.S. Coast Guard responds to incidents at sea and assists the San Francisco Fire Department along the waterfront and China Basin Channel when called upon./2/

The Mission Bay Project Area includes portions of two of three citywide Administrative Divisions (see Figure VI.D.1)./3/ Mission Bay north of 16th Street is in Division 1. The Project Area south of 16th Street is in Division 3. First response for the entire Mission Bay Project Area is provided by Battalion 3, which overlaps Division 1 and Division 3 boundaries. Battalion 3 is composed of three engine companies (Engines 1, 8 and 35), two truck companies (Trucks 1 and 8), one rescue company (Rescue 1) equipped for hazardous or extra-threatening fires and rescues, and one fireboat company (Fireboat 1)./4/ Battalion 3 headquarters is at Station 8 (36 Bluxome Street). Station 1 (416 Jessie Street) houses Engine Company 1 and Truck Company 1./5/ Station 8 houses Engine Company 8 and Truck Company 8./6/ Station 35, Pier 22-1/2 (at the foot of



13
3
35
DIVISION 1
1
36
8
30
DIVISION 3
29
25
37
0
FEET
3000

- - - - - - - MISSION BAY BOUNDARY

— — — — — DIVISION BOUNDARY

•••••••••••• BATTALION 3 BOUNDARY

① FIRE STATION

㉚ CLOSED FIRE STATION 30

Mission Bay

SOURCE: Environmental Science Associates, Inc.
and S.F. Fire Department

FIGURE VI.D.1
FIRE SERVICE

Harrison Street) houses Engine Company 35 and Fireboat Company 1. Stations 29 and 37 are the closest two fire stations to the Mission Bay Project Area outside of the Battalion 3 district; units from Station 29 sometimes respond to incidents in the western portion of Mission Bay. Four additional fire stations, Stations 3, 13, 25, and 36, also are near the Battalion 3 district and would assist in fighting a greater alarm fire./7/

Along the waterfront or China Basin Channel, Battalion 3 may call upon vessels of the Coast Guard, based at Yerba Buena Island, and the U.S. Navy, based at Treasure Island, for firefighting assistance. The Fire Department's Water Rescue Team scuba divers fight fires in the sub-structure of piers and handle water rescues./8/

An alarm for a fire or a call for aid is routed to the Fire Department's Communications Center which processes the call, dispatches personnel and classifies calls as false alarms, fire or non-fire incidents (e.g., resuscitations, first aid, extraction of trapped persons). The type of call has been shifting from fire incidents to non-fire incidents./9/

About 14 incidents occurred within the Mission Bay Project Area during Fiscal Year (FY) 1985-1986; the majority involved transients who required medical attention./10/ No greater alarm fire occurred within the Mission Bay Project Area during 1985-1986./11/ Because Mission Bay is sparsely populated, there is a concern that a fire may go unreported and develop into a greater alarm fire before the department is notified. (The area beneath I-280 has had fire safety problems caused by transients.) The Fire Department's Water Rescue Team was involved in about 40 water-related emergencies in the City in FY 1985-1986, including rescuing a man trapped in a submerged automobile at the bottom of China Basin Channel./8/ Coast Guard responses near Mission Bay during FY 1985-1986 were limited to minor incidents (e.g., engine malfunctions, out of gas)./2/

Access to Mission Bay is considered very good, except at the adjacent piers. The streets are wide and there is little traffic. Response times vary with the type of incident./12/ Response times within Mission Bay average under three minutes for fire and non-fire responses./11/ Because all three stations of Battalion 3 are located north of China Basin Channel, response to areas south of the channel could be delayed if both drawbridges at Third and Fourth Streets were raised or the crossings obstructed. However, the drawbridges are not raised simultaneously, so normally one bridge is crossable at all times./13/ A major seismic event that obstructed both bridges and collapsed the I-280 freeway would allow limited access from the south only.

Fire Department response varies with the type of incident./14/ The initial response to a non-fire incident requires a single engine or truck company. A first alarm fire response in Mission Bay requires all of the task units of Battalion 3 (i.e., Engines 1, 8 and 35, Trucks 1 and 8, Rescue 1 and Fireboat 1 if the location is adjacent to the waterfront). Back-up units from surrounding fire stations are called as needed.

A fully staffed shift for an engine company consists of one officer and three firefighters; a truck company consists of one officer and five firefighters; a rescue squad consists of one officer and three firefighters; and the fireboat company consists of one officer, one pilot and one marine engineer./15/ Duties are assigned on the basis of a standard 24-hour work shift from 8 a.m. to 8 a.m. Personnel work an average of nine 24-hour shifts each month. Battalion 3 is fully staffed on a 24-hour basis with 28 uniformed personnel on duty per shift, a total of 113 uniformed personnel, excluding Division and Battalion Chiefs./16/

Working capacity of a fire company is measured in terms of hours out-of-service per month./17/. Appendix D. Community Services and Infrastructure, Table XIV.D.3, p. XIV.D.2, lists the hours out-of-service and working capacities of each company in Battalion 3 for 1985 and 1986. During 1986, Engine Company 1 was out-of-service about 570 hours and Truck Company 1 was out-of-service about 520 hours, performing at about 85% of their official capacities. The Fire Department considers these units to be operating at their maximum practical capacity./18/

Water Supply

The primary water supply for firefighting in the Mission Bay Project Area is low-pressure domestic water from the City water mains./19/ The Auxiliary Water Supply System for Fire Protection, completely independent of the domestic water distribution system and under the sole jurisdiction of the Fire Department, provides a secondary source of water exclusively for firefighting purposes./20/ This is commonly referred to as the "high-pressure system" and is located under Third Street and around much of the perimeter of the Mission Bay Project Area (see Figure VI.D.4, p. VI.D.23)./21/ Some areas in the interior of Mission Bay and east of Third Street do not have ready access to the high-pressure system. The domestic system is normally the first to be used, providing 1,000 gallons per minute (gpm). The high-pressure system provides 10,000 gpm. The water mains in Mission Bay are in good condition and both the water supply and pressure in the Mission Bay Project Area are considered adequate for firefighting purposes. None of the City's 150 cisterns, which provide a back-up water source in the event of a water main rupture, are located within the Mission Bay Project Area. Due to the availability of water from China Basin Channel and San Francisco Bay, this is not considered a problem./21,22/

Fire Safety Ordinances

Laws and ordinances governing building structure design and equipment requirements for fire detection, restraint and extinguishment are in the California Administrative Code Title 24 and the Life Safety Provisions of the San Francisco Uniform Building Code, 1979, as amended. Enforcement of these laws and ordinances is the responsibility of the Bureau of Fire Prevention./23/ The bureau is staffed by 30 fire inspectors who conducted about 40,200 field inspections during FY 1985-1986. Smaller commercial and residential buildings are inspected by local fire station personnel under the Commercial Residential Inspection Safety Program; the program conducted about 10,700 such inspections during FY 1985-1986./8/

Hazardous Materials Responses

Incidents involving known hazardous materials are handled by the Hazardous Material Response Unit located at Fire Station 36 (at 109 Oak Street)./24/ The Coast Guard operates as the lead agency for spills of hazardous materials along the waterfront. About 300 hazardous material incidents occurred throughout San Francisco during FY 1985-1986 (see Appendix D. Table XIV.D.4, p. XIV.D.3). Six of these incidents occurred within the Battalion 3 district; none was within the Project Area./11/ Special procedures for fires involving hazardous materials include evacuation of the downwind population, approaching the fire from upwind, and the use by firefighters of chemically resistant airtight suits. Certain types of fires (e.g., those involving pesticides) may be contained and allowed to burn out rather than extinguished to prevent the spread of the hazardous materials via contaminated water. Industrial fires are more likely to involve hazardous materials than are residential fires./22/ However, industrial fire incidents are relatively few, due to the use of sprinkler systems and the annual inspection program./25/

The San Francisco Fire Code establishes a system for permitting and monitoring the use and disposal of hazardous materials. To minimize the danger from fires involving hazardous materials, the Fire Department Hazardous Materials Regulatory Section identifies the hazardous materials stored in San Francisco. Local fire stations are informed when hazardous materials are stored in cargo containers at truck terminals in Mission Bay and when fumigation is underway at the piers (see VI.N. Hazardous Wastes, p. VI.N.1)./10/

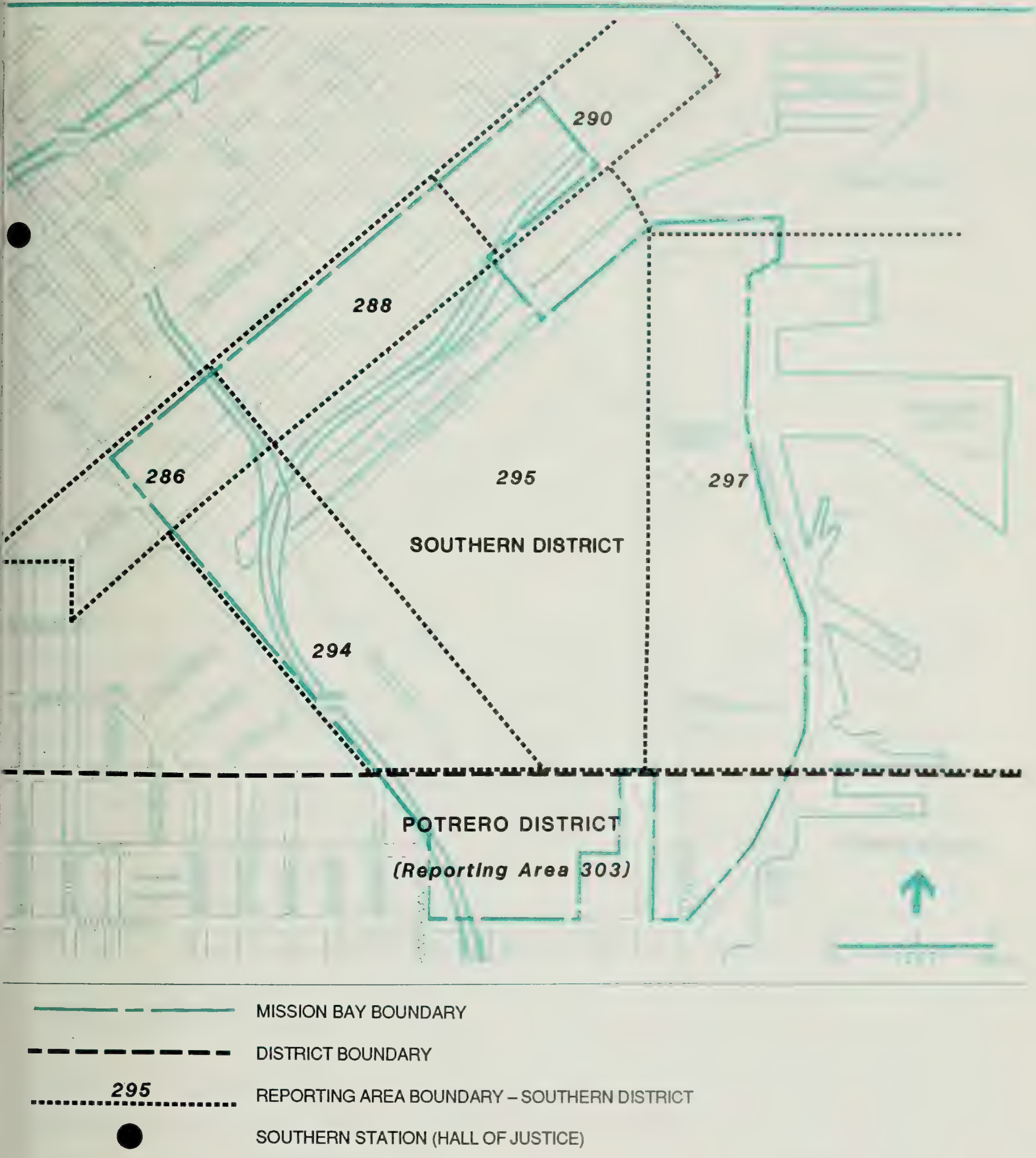
Impacts of Mission Bay Alternatives on Fire Protection are discussed beginning on p. VI.D.32.

POLICE PROTECTION

The San Francisco Police Department provides police protection to the Project Area, including the houseboats in the China Basin Channel./26/ The Police Department's personnel are assigned to the Office of the Chief and four bureaus: Field Operations, Investigations, Technical Services, and Administration. Patrol functions are performed by the police officers of the Field Operations Bureau out of nine District stations.

Mission Bay is served by two Police Department Districts. The Southern District Police Station (Company B) at 850 Bryant Street (the Hall of Justice) serves Mission Bay north of 16th Street; the Southern District covers the downtown area south of Market Street to the north side of 16th Street. The Potrero District Police Station (Company C) at 2300 Third Street serves the remainder of the Mission Bay Project Area from 16th Street south through Potrero Hill, South Bayshore, Bayview/Hunters Point and Candlestick Park areas, generally east of US 101 to the City / County line./27/ Both districts serve 16th Street. The boundaries of both districts in the Mission Bay area are shown in Figure VI.D.2. Also shown are the boundaries of the seven police reporting areas which overlay the Project Area./28/ Reporting areas are used to organize crime statistics within districts.

Police Department personnel assignments for San Francisco during FY 1984-1985 are presented in Appendix D. Table XIV.D.15, p. XIV.D.16. Staff assigned to the Southern and Potrero Districts are part of the Field Operations Bureau; 106 officers and 11 civilians are assigned to the Southern District, and 109 officers and four civilians to the Potrero District./29/ Officers from the Southern District spend about 25% of their patrol time in Mission Bay. It is estimated that less than 0.5% of the Potrero District's patrol time is spent in Mission Bay./28,30/ To patrol and serve the Southern District on a 24-hour basis requires 440 on-duty officer hours per day. About 48 of these on-duty officer hours serve Mission Bay patrol, responses or investigation. Six officers (over a 24-hour period) are needed to maintain this level of service./30/


290
288
286
295
297
SOUTHERN DISTRICT
294
POTRERO DISTRICT
(Reporting Area 303)
MISSION BAY BOUNDARY
DISTRICT BOUNDARY
295
REPORTING AREA BOUNDARY – SOUTHERN DISTRICT
SOUTHERN STATION (HALL OF JUSTICE)

SOURCE: Environmental Science Associates, Inc.
and S.F. Police Department

FIGURE VI.D.2
POLICE DEPARTMENT DISTRICTS
AND REPORTING AREAS

Units of the Office of the Chief, Investigations Bureau, Technical Services Bureau, and Administration Bureau support the uniformed patrol force. Many of these units, which are located within the Southern District at the Hall of Justice at 850 Bryant Street, perform functions throughout the City so it is not possible to allocate duty time for people in these support bureaus to specific incidents or specific areas./30/

Crime Statistics

In FY 1984-1985, about 114,700 criminal incidents were reported in San Francisco. Of these, about 60,300 were Part I incidents, violent crimes, such as homicides, thefts, burglaries, and assaults./31,32/ The remaining were Part II incidents which cover all other categories, such as narcotics, vice or disorderly conduct./29,31/ The Southern and Potrero Districts rank in the middle of the City's nine Police Districts in total number of reported offenses./32/

The Project Area north of 16th Street is overlapped by six reporting areas that encompass about 10% of the Southern District (see Figure VI.D.2, p. VI.D.7). The incidents reported in these six areas represent the generalized crime statistics for Mission Bay./33/ Mission Bay experiences relatively few criminal incidents compared to the Southern District as a whole. During FY 1984-1985 about 200 Part I incidents (less than 3% of the District's total) and about 90 Part II incidents (less than 2% of the District's total) occurred in Mission Bay./32,34/ Theft was the most frequently reported crime, accounting for more than 50% of the reported incidents, with vehicle grand theft (more than $400 value) accounting for almost 20% of the crimes. Commercial burglary is the second most frequently reported crime, accounting for slightly more than 10% of the total.

The easy access to and from the I-280 Freeway is believed to contribute to the relatively large number of vehicle thefts. In addition to criminal incidents, a large number of autos have been abandoned in the area. The isolated nature of the Project Area also attracts transients./35/ Most transients, however, can be found to the northeast of the Project Area./36/

The average response times (measured from the time the call is received to the time officers arrive on the scene) for the Southern District as a whole are approximately two minutes for Priority A calls (life-threatening situations, severe assaults and crimes in progress) and four minutes for Priority B calls (urgent situations where the crime has already occurred). The average response times for the Mission Bay Project Area are slightly longer, approximately three minutes for Priority A calls and five minutes for Priority B calls./37/ The Police Department is concerned that, with both stations located outside of the Mission Bay Project Area, it could become isolated from outside help after a seismic event if the bridges crossing China Basin Channel were obstructed and the I-280 freeway were to collapse./38/ However, Third and Illinois Streets could provide access from the current Potrero District Station south of the Project Area. The new Potrero District Station will be located south of Islais Creek Channel./39/ Were a seismic event to obstruct both I-280 south of the Project Area and the Third Street Bridge crossing Islais Creek Channel, Mission Bay could be isolated from the new Potrero District Station. More circuitous acess might be available via streets on Potrero Hill.

Impacts of Mission Bay Alternatives on Police Protection are discussed beginning on p. VI.D.41.

SCHOOLS

San Francisco Unified School District

Public primary and secondary education in the City and County of San Francisco is provided by the San Francisco Unified School District (SFUSD). The district operates 72 elementary schools (grades kindergarten through five [K-5]), 18 middle schools (grades 6-8) and 20 high schools (grades 9-12). Total district enrollment during the 1985-1986 school year was about 63,400 students./40/ Appendix D. Table XIV.D.22, p. XIV.D.24, shows the total 1985-1986 enrollment levels and total capacities for each type of school. During the 1985-1986 school year, the district operated at 95% of capacity, with space available for about 3,300 additional students in grades K-12. SFUSD staff anticipate total enrollment to grow by about 6,000 to 8,000 students between 1985 and 1995. To address this district-wide growth, district staff will consider using modular classrooms, increasing enrollments at schools with residual capacity, expanding existing facilities, reactivating currently unused or leased facilities, and building new schools./41/

For each type of school (elementary, middle and high), the district divides the City into school attendance areas. The district draws boundaries to balance the ethnic distribution of each attendance area. When school integration objectives cannot be met fully by a neighborhood school, students are assigned to a school in another neighborhood. When elementary school students are assigned to a school outside of their neighborhood, the district provides them with bus transportation to the assigned school. Middle and high school students assigned to schools outside their neighborhoods rely on public and private transportation to travel to their assigned schools. In addition to school attendance areas, many schools have a district-wide enrollment policy which allows students throughout the City to apply to those schools.

Private Schools

There are numerous private and parochial primary and secondary schools in San Francisco and the Bay Area. In the 1985-1986 school year, there were about 87,200 students in K-12 living in San Francisco. Of this total, about 22,600, or 26%, attended non-public schools: 28% in grades K-8 and 23% in grades 9-12 attended non-public schools./42/

Public School Students Living in the Project Area and Adjacent Nearby Areas

Two school-age children reside in the Mission Bay Project Area in the houseboat community on China Basin Channel; both attend private schools. Appendix D. Table XIV.D.23, p. XIV.D.25 shows the estimated number of SFUSD students who resided in Nearby Areas adjacent to Mission Bay Project Area in 1985. Those adjacent Nearby Areas include Showplace Square, North Potrero Hill, South of Market, Inner Mission, Potrero Hill, Lower Potrero Hill and the southern part of Central Bayfront. In the 1985-1986 school year, there were about 8,700 public school students living in those areas, about 13.7% of the district's total enrollment./43/

Public Schools Located in Nearby Areas Adjacent to Mission Bay

Public school students living in the adjacent Nearby Areas may attend a school located within their assigned attendance area or may apply to schools with district-wide enrollment. To achieve district integration objectives, some of the assigned attendance areas direct students to attend schools located in other areas of the City. Most students residing in the adjacent Nearby Areas attend schools located within their assigned attendance areas. Appendix D. Table XIV.D.24, p. XIV.D.27, presents the 1985-1986 school year enrollments and capacities of the eight public elementary, two middle and four high schools located in adjacent Nearby Areas. Appendix D. Figure XIV.D.1, p. XIV.D.26, shows the location of these schools. The combined enrollment of the eight elementary schools in adjacent Nearby Areas is about 3,150 students. Potrero Hill and

Horace Mann Middle Schools' combined enrollment is about 1,100. The four high schools have a combined enrollment of about 2,800. Together, schools in the adjacent Nearby Areas have enrollments of approximately 7,050 students, about 11% of total district enrollment. As a group, the eight elementary schools near Mission Bay operated beyond designated total capacity of their facilities during the 1985-1986 school year. The two middle schools operated at 93% of capacity; the four high schools operated at 86% of capacity.

The Patrick Henry Elementary campus, at Vermont and 19th Streets on Potrero Hill, is the only currently unused and available school located in the adjacent Nearby Areas. SFUSD plans to convert that school to house the International Studies Academy for about 350 to 400 students in the 1988-1989 school year./44/

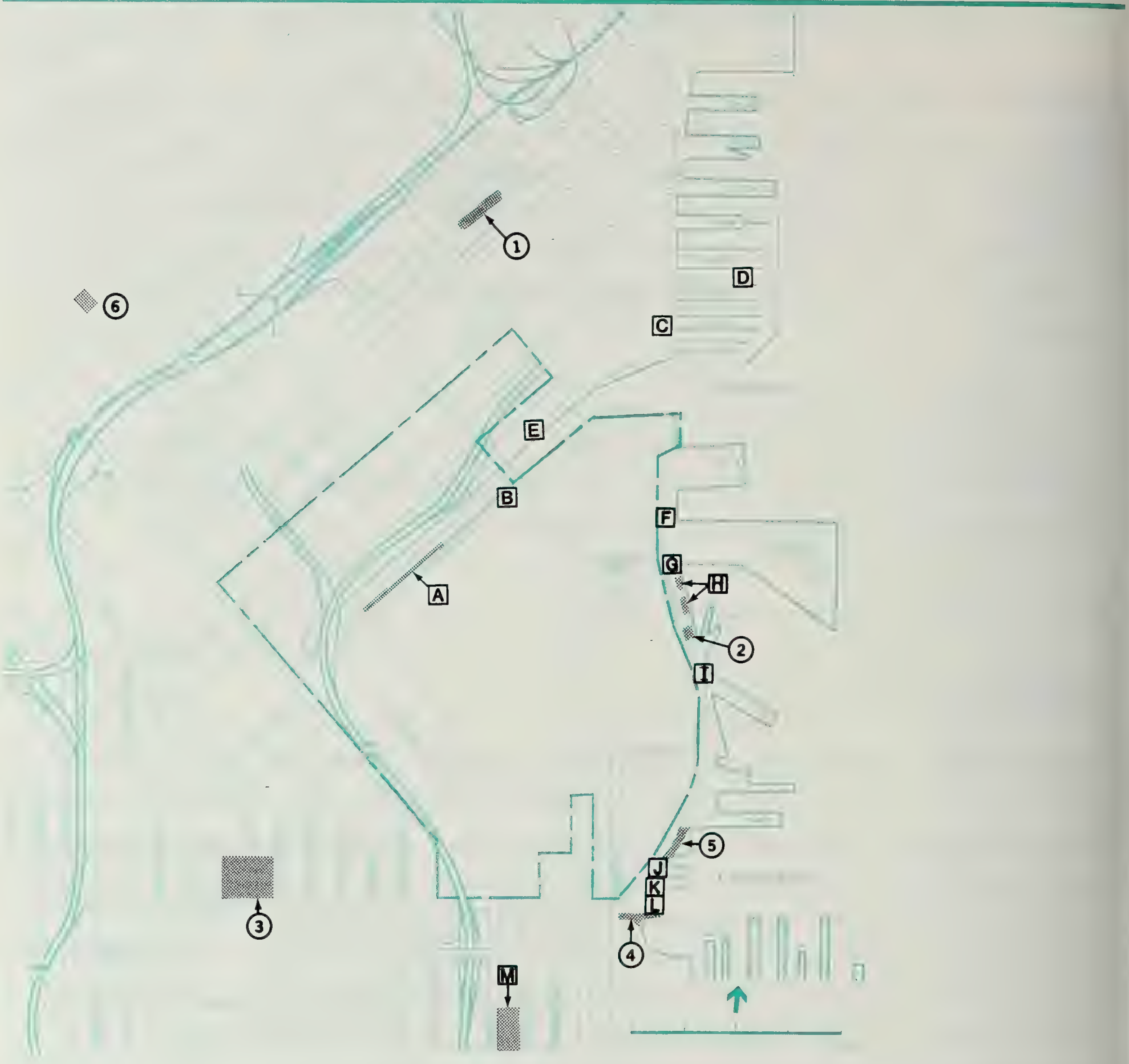
Impacts of Mission Bay Alternatives on Schools are discussed beginning on p. VI.D.49.

RECREATION AND PARKS

Existing Project Area Open Space and Recreation Facilities

The area within and surrounding the Mission Bay Project Area is poorly served by open space and recreation facilities. Figure VI.D.3 shows the location of existing park, open space and recreational opportunities available in the Project Area and within about 1,500 feet of it./45/ These shoreline parks and open spaces, waterfront restaurants, boating facilities and inland parks and recreation facilities are provided and maintained by several entities, including the San Francisco Recreation and Park Department, Port of San Francisco, San Francisco Redevelopment Agency and private businesses.

As shown in Figure VI.D.3, China Basin Channel is the only existing open space area located within the Mission Bay Project Area. On the south shore of the channel, the private Mission Creek Harbor Association operates 35 small-boat berths and 20 houseboat berths. Under its BCDC permit to use the Port-owned site, the association is required to maintain an approximately 1,400-foot adjacent strip of open space publicly accessible from Channel Street. The deck at Carmen's Restaurant, at the channel's edge near the Fourth Street Bridge, provides a publicly accessible area from which to view the



MISSION BAY BOUNDARY

PUBLICLY PROVIDED AND MAINTAINED

1 South Park (SFRPD)
2 Pier 52 Public Boat Launch Ramp (SFRPD)
3 Jackson Playground (SFRPD)
4 Fishing and Viewing Area (Port)
5 Agua Vista Park (Port)
6 Sixth and Folsom – under constr. (SFRPD)

SFRPD = San Francisco Recreation and Park Department
Port = Port of San Francisco

PRIVATELY PROVIDED AND MAINTAINED

A China Basin Channel Small-boat Harbor and Shoreline Open Space
B Carmen's Restaurant Deck
C The Ship Restaurant Viewing Deck
D South Beach Small-boat Marina
E China Basin Building Boardwalk
F Olive Oil's Bar and Grill Viewing Area
G Mariposa / Hunters Point Yacht Club
H Continental Maritime Sitting and Viewing Areas (2 areas)
I Bay View Boat Club
J Mission Rock Resort (Restaurant) Deck
K San Francisco Boat Works (Private Boat Launching Ramp)
L The Ramp Restaurant Viewing Area
M Esprit Park

Mission Bay

SOURCE: Environmental Science Associates, Inc. and S.F. Recreation and Park Department

FIGURE VI.D.3
EXISTING RECREATION AND OPEN SPACE

channel. Neither the channel shoreline open space strip or the deck at the restaurant are operated or maintained by the Recreation and Park Department or the Port.

Existing Nearby Parks, Open Space Areas and Recreation Facilities

Shoreline Parks and Open Spaces

The China Basin Building boardwalk provides benches and picnic tables along the north side of China Basin Channel between Third and Fourth Streets, publicly accessible during regular business hours. The approximately 800-foot boardwalk is landscaped with trees and shrubs in large planters and offers views of the channel and nearby maritime activities.

Near Pier 52, Continental Maritime of San Francisco, Inc. developed two shoreline sitting and viewing areas in conjunction with development of its drydock facilities at Pier 50 as required by the Port and BCDC. One 4,500-square-foot area is located on China Basin Street adjacent to the Pier 52 public boat launch ramp and includes three benches and landscaping. To the north, a second, 4,225-square-foot asphalt area provides four benches and a kiosk that displays photographs of local maritime history./46/

Agua Vista Park, owned and maintained by the Port of San Francisco, is a 375-foot-long, 30-foot-wide landscaped shoreline strip near the southern end of China Basin Street, immediately north of the Mission Rock Resort. The park includes benches, a picnic table, a sandbox, and a 1,000-square-foot public fishing pier.

On Illinois Street, immediately south of the foot of Mariposa Street, a 200-foot path leads to an approximately 10,000-square-foot shoreline fishing and viewing area surrounded by maritime industry. Except for weathered asphalt paving and a dilapidated picnic table, the area is unimproved. The area is owned and maintained by the Port of San Francisco.

Waterfront Restaurants

Several waterfront restaurants located near the Project Area provide open space accessible by the public, as required by BCDC. These restaurants include: The Ship, Wharfside Hofbrau at the China Basin Building boardwalk, Olive Oil's Bar and Grill, Mission Rock Resort, and The Ramp.

Boating Facilities

The Recreation and Park Department maintains a 2,600-square-foot paved public boat launch ramp and floating platform near Pier 52./47/ This Port-owned property is adjacent to the 4,500-square foot landscaped area maintained by Continental Maritime, discussed above.

Several private boating facilities are available along the waterfront near the Project Area. These include the South Beach Small-Boat Marina, a 686-berth marina, which opened in 1986; docking facilities at the China Basin Building; the Bay View Boat Club and the Mariposa/Hunters Point Yacht Club; and the San Francisco Boat Works small-craft drydock and launching ramp./48/

Parks

South Park is an 0.8-acre neighborhood park that includes lawn areas, picnic tables, benches, and a children's play area. It is owned and maintained by the Recreation and Park Department. Jackson Playground, also owned and maintained by the Recreation and Park Department, is a 4.4-acre park with a 3,000-square-foot multi-purpose recreation building with a half-court gym, a children's play area with playground equipment, two tennis courts, a baseball diamond, a softball diamond, and an outdoor basketball court.

Warm Water Cove is an approximately 0.7-acre open space at the foot of 24th Street, about 4,000 feet from the Project Area. It includes a shoreline path and an approximately 1,500-foot fishing pier. The park is used primarily as a fishing site.

Esprit Park is a two-acre private park for Esprit employees. Although it is not officially open to the public, area workers, residents and visitors may use the park by obtaining a pass from the Esprit office. The park has lawn areas, a tennis court, benches and jogging/fitness paths.

Recreation and Senior Centers

There are no recreation centers (facilities that include a full-court gym) within 1,500 feet of the Project Area. The 9.5-acre Potrero Hill Playground and Recreation Center, located at 22nd and Arkansas Streets, about 2,500 feet from the Project Area, is the Recreation and Park Department recreation center nearest the Project Area. It includes two tennis courts, a baseball diamond, a softball diamond, basketball courts, recreation center/gym, two multipurpose rooms, and children's play areas. The Mission Recreation Center at Harrison and 20th Streets, about 1.0 mile from the Project Area, includes a gym, squash courts, exercise rooms, and other services. A new recreation center under construction at Sixth and Folsom Streets will have a gymnasium, exercise room, meeting room, kitchen, and outdoor basketball court.

None of the parks described above provides senior programs. The closest senior center to the Project Area is the Potrero Hill Neighborhood House at De Haro and Southern Heights Streets, about 0.5 mile from the Project Area. The private non-profit House offers recreation, health screening and nutrition programs to seniors in the Potrero Hill, Lower Potrero Hill and Inner Mission Nearby Areas./49/

Plans and Policies

Several planning documents contain policies and proposals that guide recreation, open space and park land uses in the Mission Bay area. These documents also set forth policies for the shoreline, the China Basin area including China Basin Channel, and the Central Basin area. These policies are summarized below and discussed in greater detail on p. VI.D.87.

San Francisco Master Plan

Recreation and Open Space Element. The Recreation and Open Space Element of the San Francisco Master Plan is introduced in VI.A. Public Plans, Policies and Permits, p. VI.A.11./50/ The Element notes that a plan for the Mission Bay area is being prepared and that further revisions to recreation and open space policies will evolve as part of that planning effort. The Northeastern Shoreline Plan map of the Element identifies the northern shoreline of China Basin Channel as an area where new public parks and open space should be provided. The Eastern Shoreline Plan map identifies the southern shoreline of the channel, and facilities at the Pier 52 public boat launch ramp and Aqua Vista Park as areas where the quality of existing open space and recreation should be maintained and improved. It also shows that new shoreline open space should be provided "in the general vicinity" of the intersection of Third and Fourth Streets. The proposed element also calls for reserving a waterfront strip for a continuous pedestrian and bicycle trail system along the San Francisco Ocean and Bay shoreline. As shown on the Northeastern and Eastern Shoreline Plan maps, a preliminary proposed alignment of this trail would be along the shoreline of China Basin Channel and continuing south along China Basin Street. At the Pier 52 public boat-launch ramp, the proposed Element recommends that the shoreline be stabilized, additional informational signing be provided and, as opportunities arise, the public access area be enlarged. The Element also calls for maintaining and expanding Agua Vista Park.

The Northeastern and Eastern Shoreline Plan maps also designate a "Shoreline Zone" within which new development would be subject to land use, open space and urban design guidelines. The Shoreline Zone includes land along China Basin Channel and along the Bay waterfront abutting China Basin Street, then extending south of the Project Area.

Central Waterfront Plan. The Central Waterfront Plan, a part of the Master Plan (see VI.A. Public Plans, Policies and Permits, p. VI.A.2), sets forth several policies for recreation, open space and public access to the waterfront, including policies for the China Basin and Central Basin areas./51/ The plan calls for developing both sides of China Basin Channel west of Fourth Street for public access, viewing and waterfront recreation. Outside the Project Area on the north side of the channel between Third and Fourth Streets a pedestrian promenade and bicycle path and public viewing and fishing areas would be developed, where compatible with Port maritime activities. The plan also states that existing commercial/recreation and housing uses in the China Basin area should be maintained.

In the Central Basin Area, the Central Waterfront Plan calls for improving and expanding Agua Vista Park and the Warm Water Cove area. New improvements to Agua Vista Park would include an expanded public beach and waterfront park, and a small-boat marina that must be compatible with existing and planned maritime and private ship repair activities. For Warm Water Cove, the policy calls for a picnic and fishing pier south of 24th Street, with adequate buffering from surrounding industrial uses, and public access to the north side of the Cove.

Bay Conservation and Development Commission

The plans and policies of BCDC (see p. VI.A.22) include several policies for recreation, open space and public access use of the San Francisco waterfront. BCDC's San Francisco Bay Plan recommends that additional shoreline parks, marinas, boat launching lanes, fishing piers, swimming beaches and water-oriented commercial-recreational establishments be developed throughout the Bay shoreline with maximum feasible public access; the Public Access Supplement to the Bay Plan should be used as a guide to determine whether a project provides maximum feasible public access./52/

BCDC's Special Area Plan for the San Francisco Waterfront recommends continuous public access and limited Bay-oriented commercial recreation around China Basin Channel. It also recommends that the area immediately east of the Third Street Bridge on the south side of China Basin be reserved for public access and view areas; the public launching ramp located in the Pier 52 area be retained; the Central Basin area continue to be developed for public access and waterfront recreation; and when no longer needed for maritime activity, Pier 64 be developed for park and marina use./53/

Impacts on Recreation and Parks are discussed beginning on p. VI.D.61.

LIBRARIES

The Library nearest Mission Bay is the Potrero Branch at 1616-20th Street. Farther away are the Main Library at the Civic Center and the Business Branch at 530 Kearney Street. There are no public libraries in the Project Area./54/

The Potrero and Business Branches house approximately 19,500 and 18,400 volumes, respectively; the Main Library houses approximately 935,000 volumes. The principal users of branch libraries are children, parents, lower and middle-income persons, and students. The Business Branch primarily serves the local business community./55/ The Main Library serves all ages and users from every economic and social segment of the City, the Bay Area and Northern California.

The San Francisco Public Library long-range development plan is to consolidate neighborhoods services in larger and fewer branches. Currently, there are 26 branch libraries. There are, therefore, no current plans to expand services in the Mission Bay, South Beach, Rincon Point, and Yerba Buena Center areas./55/ The San Francisco Library Commission is reviewing preliminary plans for a new Main Library at the Civic Center to replace the existing building, which reached its design capacity in 1944./56/ If funded and developed, the new library would provide space for twice as many books and would increase the usable floor area from about 155,000 to 277,000 net square feet at Marshall Square, immediately south of the present Main Library and across Fulton Street.

Impacts on Libraries are discussed beginning on p. VI.D.92.

PUBLIC HEALTH SERVICES

The San Francisco Department of Public Health (DPH) provides all public health services in San Francisco, administered from the central office at 101 Grove Street. The department divides the City into five geographic service districts; Mission Bay is in District One. Programs are administered at each District Health Center, the Civic Center headquarters and other locations in the City. The following services are available:/57/

Emergency Medical Services/58/

Ambulance service in San Francisco is provided by the Paramedic Division of San Francisco General Hospital ambulance service, with back-up service provided by three private ambulance companies. DPH Central Medical Emergency Dispatch dispatches ambulances to approximately 69,300 requests for medical assistance per year. Approximately 50,000 or 75% of the total ambulance responses in San Francisco are provided by the City ambulance service.

The City-owned ambulance fleet consists of 14 vehicles and one 24-hour multi-casualty vehicle. About 140 full- and part-time paramedics operate the service on a 24-hour basis. On-duty ambulances are staffed by two paramedics on eight-hour shifts. On average, approximately half of the fleet is available during each shift.

Central Medical Emergency Dispatch staff rate each ambulance request according to the seriousness of the illness or injury. Code 1 calls are for routine transport, such as scheduled rides to the hospital for bed-ridden patients. Code 2 calls are "urgent," but with no imminent danger (e.g., a fractured leg) and Code 3 calls are "life-threatening emergencies," such as a heart attack. The San Francisco Fire Department also responds to all Code 3 medical emergencies. All fire personnel are trained in resuscitation and first aid, and all fire companies carry first aid equipment.

Of the approximately 69,300 ambulance responses in the City each year, about 54,700 (79%) are classified as Code 1 or Code 2 and about 14,600 (21%) are Code 3 responses. In Ambulance Zone 6, the area that includes Mission Bay and is bounded by US 101, Townsend Street, the Bay, and Oakdale Avenue, there are about 550 Code 3 medical emergencies each year, based on a DPH survey conducted in October 1986. During October 1986, the citywide mean ambulance response time for Code 3 calls, measured from the moment the Central Medical Emergency Dispatch receives a call to when an ambulance reaches the scene, was 6.5 minutes; the mean ambulance response time in Zone 6 was nine minutes./59/ One of DPH's program objectives for ambulance services during the 1986-1987 fiscal year is to respond to 90% of Code 3 emergency calls in six minutes or less.

Community Public Health Program - Environmental Health Services

Environmental Health Services is staffed by registered sanitarians who conduct periodic inspections of food, dairy, water, toxic materials, and waste facilities; monitor occupational health and safety; provide surveillance of public and private institutions (e.g., nursing homes, child care centers); investigate housing complaints and conduct hotel inspections; inspect solid waste management plants; inspect for rodents and other disease-carrying organisms; and enforce the City's Smoking Pollution Control Ordinance. DPH has identified the possible existence of rodent populations in abandoned buildings along the waterfront near Mission Bay./60/

Toxics Control Management Program

DPH has developed and implemented a program for the disposal of hazardous wastes generated by city departments, and also prepared a comprehensive toxic control program to oversee the management of all toxic and hazardous materials within the City. The Toxic Control Management Program implements and oversees five program areas:

- Hazardous Waste Program. This program oversees the following functions: 90-day hazardous waste disposal; site inspections/environmental assessments; standard operating procedures and record keeping; treatment, storage and disposal facilities; hazardous waste hauler permits. This program covers only City agencies.

- Hazardous Materials Permit Program. This program conducts inspections and issues permits for above- and below-ground storage facilities and tanks containing hazardous materials for both the private and public sectors.

  Permits for the storage of hazardous wastes will be required under the amended Hazardous Material Permit and Disclosures Ordinance./61/ The ordinance defines hazardous materials and requires anyone who stores more than 500 pounds, 55 gallons or 200 cubic feet of hazardous materials to obtain a storage permit. Any quantity of extremely hazardous materials, as defined by the ordinance, also is subject to the requirements of the ordinance. Storage of hazardous materials in underground storage tanks is required to comply with specified tank construction and monitoring standards consistent with state law. Abandoned storage facilities will be closed pursuant to a plan approved by DPH. The ordinance also requires annual inventories, emergency response plans, annual inspections, cleanup cost recovery, and fee collection./62/

- Toxic Education and Training Program. This program provides education and training of DPH inspectors and City employees on the worker's Right to Know (training to safely handle hazardous materials in the workplace), hazardous materials, and waste laws and regulations. It also provides public education and outreach to businesses and citizens about toxics laws and hazardous and toxic materials.

- Community Toxics/Chemical Emergency Response Program. This program addresses community complaints, and provides site mitigation and soil sampling. It also provides emergency response to clean up asbestos and household hazardous waste and leaking City-owned underground tanks.

- Citizen Complaints. This program performs inspections in response to complaints regarding noise, air, chemical hazards, lead poisoning, or other environmental factors in non-occupational situations, e.g., resident complaints about asbestos in apartment buildings.

DPH and the Department of Public Works (DPW) administer the Hazardous Soils Analysis Ordinance (No. 253-86) adopted in June 1986. The ordinance addresses soil contamination and inspections required as part of the San Francisco Public Works Code, Section 1000 et seq. The ordinance states that certain building permits may be issued only after the permittee prepares a site history, analyzes the soil for the presence of hazardous wastes and, where applicable, seeks approval of hazardous waste remedial mitigation measures from federal and state authorities and completes the site mitigation (see VI.N. Hazardous Wastes, p. VI.N.2).

The Southeast Water Pollution Control Bureau of DPW tests water quality and bacterial levels monthly in China Basin Channel, for compliance with state standards in the Health Services Health and Safety Code, Title 22. Recent water quality data are presented in Appendix J, Hydrology and Water Quality, Table XIV.J.5, p. XIV.J.11. If raw sewage overflows occur, DPW posts signs prohibiting contact with contaminated water. Water quality issues in Mission Bay are discussed in VI.L. Hydrology and Water Quality, beginning on p. VI.L.22.

Community Mental Health Services/63/

Community Mental Health Services (CMHS) provides medical, psychological and social rehabilitation services to San Francisco residents. Clinical services consist of inpatient treatment, residential treatment, partial-day treatment, outpatient treatment, case management, consultation, education and information. In FY 1985-1986, CMHS served 20,000 different individuals: 14% were children, 74% were adults and 11% were geriatric (1% were of unknown age). The closest CMHS facility to the Mission Bay area is the South of Market Outpatient Clinic at 471 Jessie Street.

Other DPH Programs

DPH also operates the following programs, which would not be directly affected by Mission Bay; potential indirect demand of Mission Bay population on those services cannot be reasonably estimated.

- San Francisco General Hospital (SFGH), with 582 beds, is located at 1001 Potrero Avenue. The hospital focuses on providing care to the medically indigent, newly arrived immigrant and high-risk populations, and is the only 24-hour major trauma and mass casualty center in San Francisco.

- Two SFGH outpatient clinics are located in the vicinity of the Mission Bay Project Area: the South of Market Health Center at 551 Minna Street and the Caleb C. Clark Potrero Hill Health Center at 1050 Wisconsin Street. The South of Market Health Center provides family-oriented general practice services. It operates 30% over capacity, and DPH is considering relocating certain services of the center to larger facilities./60/ The Caleb G. Clark Potrero Hill Health Center provides a full range of primary, comprehensive health and dental care to its patients, most of whom are residents of the Potrero Hill area.

- The Community Public Health Program offers preventive health care services and public health nursing in the Project Area at the District One Health Center, 3850 17th Street near Noe Street.

- The AIDS Division, at 1111 Market Street, conducts surveillance for AIDS and related diseases, epidemiological and biomedical research, and, in conjunction with other DPH offices, AIDS prevention, planning and policy activities.

- The Division of Drug Programs provides, through contractors, services for drug-use treatment and prevention. Two drug abuse clinics are located near the Mission Bay Project Area. California Detoxification Programs, Inc. at 75 Townsend Street, a non-profit agency, operates a fee-for-service methadone program; the Fort Help Clinic at 322 Sixth Street operates methadone detoxification programs./64/

- The Division of Alcohol Programs funds about 20 multi-service programs; none of these clinics are located near the Mission Bay Project Area./65/

Impacts of Mission Bay Alternatives on Public Health Services are discussed beginning on p. VI.D.93.

WATER SUPPLY

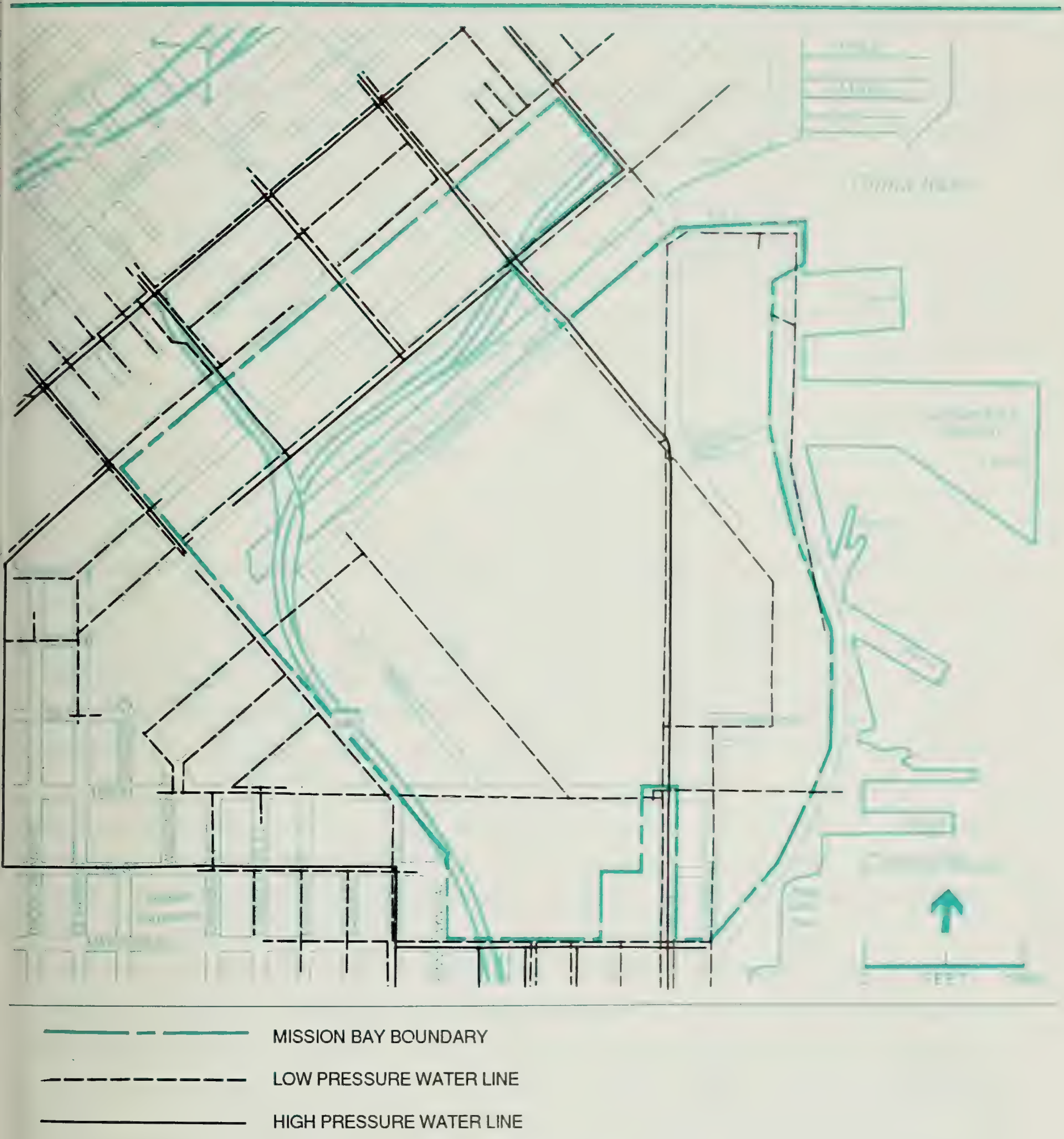
Citywide System

The San Francisco Water Department stores and distributes potable water for domestic use and fire protection in San Francisco. The system also serves areas of San Mateo, Alameda and Santa Clara counties through the wholesaling of water to public and private water companies along water transmission routes./66,67/ Transmission mains deliver water to 14 storage and distribution reservoirs in the City. In 1985, citywide average water demand was 95 million gallons per day (mgd). The 1985 peak demand of 118.7 mgd occurred on June 10./68,69/ The Water Department's capital improvement program provides for renewing and improving the water system on a continuing basis. The replacement program targets older mains with leakage problems. The repair schedule is decided at the beginning of each fiscal year and often coincides with street resurfacing plans./70/

Mission Bay

The Mission Bay site is entirely within the University Mound Reservoir pressure zone. The reservoir, located on University Street near McLaren Park, has a storage capacity of 140.9 million gallons, equivalent to four to five days of water storage for the University Mound pressure zone service area./68,70/ Portions of three University Mound service districts serve Mission Bay. Most recent average daily and peak historical water demand in those districts is shown in Appendix D. Tables XIV.D.33, and XIV.D.34, p. XIV.D.37. Current water demand in the Mission Bay Project Area is estimated to be approximately 80,000 gallons per day (gpd)./71/

The City's low-pressure water system provides day-to-day water supply for residential and business uses. In the Mission Bay Project Area, the system consists of cast iron pipes varying from eight inches to 16 inches in diameter. The pipes are located generally within the right-of-way of improved streets throughout the area. The City's high-pressure system parallels, in several instances, the low-pressure system and is intended to provide necessary fire flow pressure and volume to the area. High-pressure lines range from 12 inches to 16 inches in diameter./72/ For more information on the high-pressure system, see Fire Protection, p. VI.D.4. The existing water system is shown in Figure VI.D.4.


China Basin
FEET
MISSION BAY BOUNDARY
LOW PRESSURE WATER LINE
HIGH PRESSURE WATER LINE

Mission Bay

SOURCE: KCA Engineers, Inc.
and S.F. Water Department

FIGURE VI.D.4
EXISTING WATER LINES

The Water Department has not identified any current water supply problems in the Mission Bay area./70/ Water mains in the area were generally constructed in the period from 1887 to 1928./69/ Although some older mains may have reduced capacity due to internal crusting, they continue to function adequately. Steel restrainers may be placed on the main connections in the future to improve strength and flexibility./73/

Impacts of Mission Bay Alternatives on Water Supply are discussed beginning on p. VI.D.100.

SEWERS AND WASTEWATER TREATMENT

Citywide Facilities

The Clean Water Program, a division of the San Francisco Department of Public Works, manages the planning, design and construction of new wastewater facilities in the City. The City's combined wastewater system collects both rainfall runoff and sewage from residential, industrial and other uses. San Francisco sewage is treated at three water pollution control plants (WPCP). The Southeast and North Point plants are components of the Bayside Core system, which serves the eastern portion of the City, including Mission Bay. The Southeast plant treats dry and wet weather flows from this portion of the City; the North Point plant operates as a back-up facility during wet-weather periods. The Richmond-Sunset plant serves the west side of San Francisco. San Francisco WPCP functions are described in Appendix D. Table XIV.D.37, p. XIV.D.40.

About 102 million gallons of sewage (average dry-weather flow) are currently produced in the City each day. Because of combined sewer and storm drains, the treatment system cannot handle all of the wastewater produced during storms. When the rainfall exceeds 0.02 inches per hour, treatment plant capacity is exceeded. Untreated wastewater flows into storage facilities and then, if storage capacity is exceeded, into San Francisco Bay and the Pacific Ocean through about 40 bypass points located on the perimeter of the City./74/ Where recent storage facility improvements have been completed, overflows occur eight to ten times a year. For areas not yet benefiting from such improvements, overflows occur about 80 times a year. Based on a 72-year average of rainfall data, of 45.9 billion gallons of annual citywide wastewater flow, 36.6 billion gallons are sewage and 9.3 billion gallons are stormwater; up to 7.3 billion gallons of wastewater (16%) flow untreated into the Ocean and Bay each year./75/ During the 1986-1987 wet-weather season, 260 million gallons overflowed from the North Shore and Channel Street systems./76/ However, as improvements are completed, untreated wastewater overflows will occur less often.

The San Francisco Wastewater Master Plan, adopted in 1973 and reconfirmed 1980, provides for construction of an integrated system of sewers, tunnels, pumping stations, treatment plants, and outfall facilities. The City recently completed portions of the Bayside and Westside Two-Core sewage treatment system./77/ In 1982, the major portion of the Bayside Core facilities was brought into operation. When fully completed, it will be capable of collecting and treating all dry-weather Bayside flows to the secondary level (90% solids removal) and about two-thirds of the wet-weather flows to the primary level (50% solids removal)./78/

To achieve full compliance with the Regional Water Quality Control Board's requirements for control of combined sewer overflow, the Clean Water Program may have to provide additional wet-weather treatment capacity, or provide more storage volume to prevent overflows./79/ Planned improvements in the Wastewater Master Plan include that additional capacity. Those improvements were anticipated to be operational by the year 2000.

Mission Bay

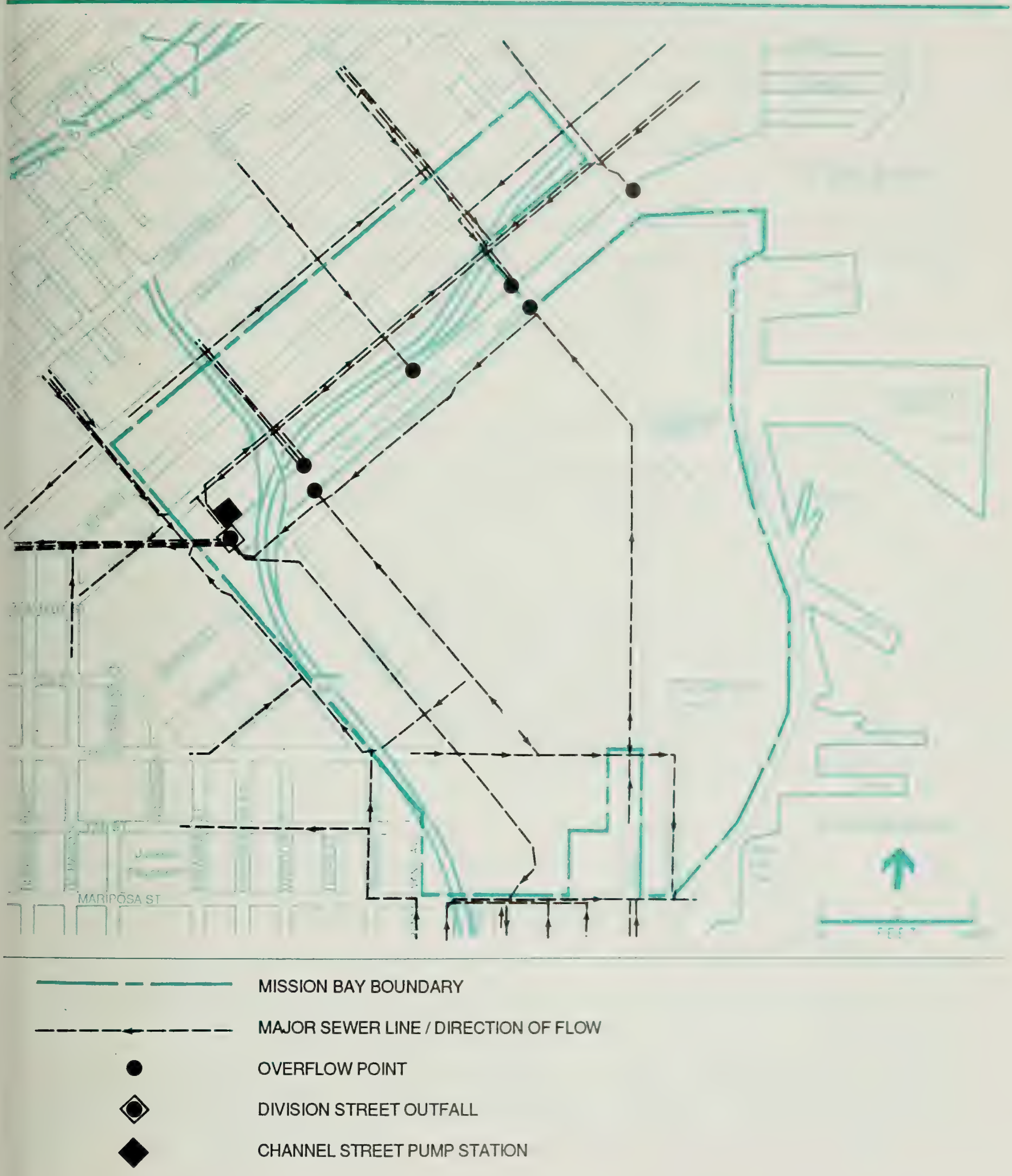
Estimated sewage generation during 1985 from the Project Area was approximately 72,000 gpd./80/ A map of the existing sanitary and storm sewer system in the Mission Bay area is shown in Figure VI.D.5. Sewage from north of China Basin Channel drains to an 18-foot-by-18-foot reinforced-concrete, pile-supported box sewer, which runs along the Embarcadero and Berry Street to the Channel Street Pump Station at the west end of the channel. Major contributing sewers to this main are at Howard, Bryant, Third, Fourth, Fifth, and Sixth Streets. Sewage from south of the channel drains to an 11-foot-by-11-foot reinforced-concrete, pile-supported sewer, along the south edge of the channel and then flows to the Channel Street Pump Station, with major contributors at Fourth and Sixth Streets. The Division Street Four-Compartment Sewer drains from the west to the Channel Street Pump Station.

The Channel Street Pump Station has a capacity of 114 mgd and pumps sewage flows to the Southeast WPCP. This pump station is capable of handling dry-weather sanitary sewer flows and flows generated by minor storms. When the capacity of the pump station is exceeded, the combined sewage is stored in the box sewers along Berry Street, the Embarcadero and Channel Street until the pump station can transport the stored volume. When large storms occur and the storage capacity of the box culverts is exceeded, the sewage overflows into China Basin Channel at seven overflow points: at the north side of the channel at Third, Fourth, Fifth and Sixth Streets, and at the south side at Fourth and Sixth Streets. In addition, the Division Street sewer, which stores about one-half of the wastewater volume in the channel area, overflows into China Basin Channel during large storms. Figure VI.D.5 shows the locations of these overflow points.

It is estimated that before the Bayside System was upgraded in 1982, these wet weather overflows into the channel occurred as many as 40 times per year, creating a sanitation, odor and aesthetic problem. Fifteen overflow events occurred during the 1985-1986 wet-weather season and 11 occurred during the 1986-1987 season./76/ Improvements completed in early 1987 include a gate restraint project and the Division Street outfall-Berry Street storage box connection. The gate restraint project optimizes the storage capacity in the Berry Street and Channel Street storage facilities to a predetermined level. Overflows previously occurred at a lower outfall elevation, depending on the tide levels. The Division Street sewer connection diverts flow from the Division Street outfall and provides additional wastewater storage capacity/74/. Those improvements are expected to reduce overflows to about ten per year, and China Basin Channel water quality will be improved./75/

The majority of the sewer and stormwater mains in the Mission Bay area are about 70 to 80 years old. The smaller mains are constructed of concrete or clay; larger mains are brick or reinforced concrete on piles. These older mains must be upgraded to handle projected five-year storms./75/ Structurally inadequate lines are a high priority for replacement. The majority of Mission Bay sewage currently is generated by light industrial or warehouse uses. Inadequacies in the existing infrastructure at Mission Bay have not been reported by existing residents or businesses, perhaps due to the relatively small population of the area./75/

Impacts of Mission Bay Alternatives on Sewers and Wastewater Treatment are discussed beginning on p. VI.D.104.


MARIPOSA ST
FEET
MISSION BAY BOUNDARY
MAJOR SEWER LINE / DIRECTION OF FLOW
● OVERFLOW POINT
◈ DIVISION STREET OUTFALL
◆ CHANNEL STREET PUMP STATION

Mission Bay

FIGURE VI.D.5
MAJOR SEWER LINES

SOURCE: KCA Engineers, Inc.

SOLID WASTE DISPOSAL

Citywide System

The City and County of San Francisco disposed of approximately 670,000 tons of solid waste in 1985, an average of about 1,780 tons per day./82/ The Office of the Chief Administrative Officer sampled the City's waste stream composition in December 1985, March 1986, June 1986, and September 1986. The sampling showed that the waste stream by weight consists of about:

- 48% paper, newspaper, cardboard;
- 10% plastics;
- 24% yard wastes, food, wood, other organic materials; and
- 20% ferrous materials, aluminum, glass and other inorganic materials./83/

Downtown office and commercial areas are responsible for a disproportionate share of the paper and cardboard generated. At the end of 1985, the City recycled approximately 24% of its solid waste. The City's goal is to increase the amount of solid waste recycled to 35% by 1996 through a variety of recycling programs. These programs include curb-side pick-up, community drop-off centers, buy-back centers, office paper and commercial recycling, bar/restaurant glass recycling, and an increased role by the City in coordinating recycling programs./82/

Solid waste collected throughout the City by Golden Gate Disposal and Sunset Scavenger Companies is transported to the solid waste transfer station at the San Francisco - Brisbane border, and from there hauled by the Sanitary Fill Company to the Altamont Landfill northeast of Livermore in Alameda County.

San Francisco has an interim five-year contract (begun in 1983) for disposal of all of its solid waste at the Altamont Landfill./84/ The City has obtained a longer-term contract with the Alameda County Solid Waste Management Authority and the Oakland Scavenger Company to accept a total of 15 million additional tons of San Francisco's solid waste at the Altamont Landfill site. Disposal will begin on November 1, 1988, with no fixed termination date. Assuming the continuation of current garbage generation, the 15-million-ton limit would be reached near the end of the year 2009./84/ The San Francisco Board of Supervisors approved the disposal contract with Alameda County on December 8, 1986./82/ The agreement includes a sliding-scale limit on the 15 million tons of solid waste, which would accommodate a projected disposal limit of 653,400 tons in 1988 to 758,700 tons in 2009./84/

The City currently does not have under consideration disposal solutions for beyond 2009, but it is assumed increased recycling will allow the City to use the landfill beyond that time. A waste-to-energy project might provide additional disposal capacity, and a proposed Bay Area Resource Recovery Facility near the Port of Redwood City could accept San Francisco waste as early as 1990, and could handle all of the City's processible waste. Residue requiring disposal after combustion of solid waste would amount to approximately one-third of the input, by weight./82/

Mission Bay

Two private collection companies serve the Mission Bay area; China Basin Channel is the dividing line between the two service areas. Sunset Scavenger Company serves the larger portion of the site south of the channel, and Golden Gate Disposal Company serves the area to the north.

Existing land uses on the site generate approximately 7,000 tons of solid waste per year, an average of approximately 9.1 pounds of solid waste per square foot of floor area per year. The waste stream consists primarily of light industrial matter and restaurant waste (Class II materials) and debris boxes, paper and warehouse waste (Class III materials). The Class II wastes account for approximately 29% (2,000 tons per year), and Class III, approximately 71% (5,000 tons per year) of solid waste generated in the project area./85,86,87/

The scavenger companies do not collect toxic or hazardous waste (Class I) materials in the project area. If there were a need for such hazardous waste removal, Sunset Scavenger and Golden Gate Disposal Companies are associated with firms that provide such service./85/ VI.N. Hazardous Wastes, pp. VI.N.14-VI.N.16. discusses industries in or near the Project Area that generate hazardous wastes.

Impacts of Mission Bay Alternatives on Solid Waste Disposal are discussed beginning on p. VI.D.108.

STREETS

The existing roadway network is described and shown in VI.E. Transportation, pp. VI.E.2-VI.E.7.

Maintenance/88/

DPW maintains most of the streets in the Project Area. These include Townsend, Berry, Third, Fourth from Townsend to Third, Sixth, Seventh, Illinois from Eldorado to Mariposa, Sixteenth, and Mariposa Streets./89/ Other streets are within the Port of San Francisco's jurisdiction and the Port either maintains them or contracts maintenance services from DPW. These include Channel, China Basin, Mission Rock, Fourth from Illinois to Third, and El Dorado Streets./90/ The maintenance of other streets, including King Street, Owens Street and Illinois Street from El Dorado to Fourth, is the responsibility of the adjacent property owner, Santa Fe Pacific Realty Corporation.

Mission Bay Project Area streets are in adequate condition, commensurate with their current levels of use. Parts of Townsend Street and other streets in the Project Area and South of Market area have subsided (settled). During the summer of 1987, DPW completed the resurfacing of the entire length of Townsend Street, returning its level up to official grade./91/ DPW does not have any current plans for other similar major maintenance or improvement projects for other streets in the Project Area, although on Third Street it would perform emergency maintenance, such as filling potholes, to keep the street in safe operating condition. Construction of any I-280 Transfer Concept Program roadway improvements, still subject to final design and funding decisions, are not included in DPW's program at this time.

Ownership/92/

The ownership of streets and former street rights-of-way in the Mission Bay Project Area is currently being researched by the Real Estate Department, the City Attorney's office and the title companies involved. The status of such properties in the Project Area is therefore still subject to final determination of legal ownership.

Some streets have been paved and utilized as public streets; others have not been paved, have never been used as public streets and are referred to as "paper streets." Some former street rights-of-way have been formally vacated by due legislative process, but title was never transferred to adjoining property owners.

Street Vacation Petition Process/92/

The street vacation petition process allows for the purchase of streets. The process is usually initiated by an adjoining property owner. DPW would solicit advice from public and private entities as to reserving any easements for purpose of telephone, electricity, water, sewer and gas. If there were no objections to the proposal, DPW would forward it to the Interdepartmental Staff Committee on Traffic and Transportation (ISCOTT), consisting of staff from the Fire, Police, Port and City Planning departments, and the Port of San Francisco. ISCOTT's formal report, containing the Committee's recommendations, would be evaluated for consistency with the San Francisco Master Plan. If the Department of City Planning finds the proposal to be in conformity with the Master Plan, the Real Estate Department and Department of Public Works would issue a preliminary opinion of the property's value and prepare legislation for consideration by the Board of Supervisors. If the ordinance were adopted by the Board, the Real Estate Department would process a quitclaim deed to the petitioner upon payment of the appraised value./93/

Vacation of any streets that may be identified as held in the public trust by the Port would require coordinated involvement of the State Lands Commission (SLC) (see VI.A. Public Plans, Policies and Permits, p. VI.A.54) and the Port to determine if an exchange for other lands could be accomplished.

Impacts of Mission Bay Alternatives on Streets are discussed beginning on p. VI.D.112.

IMPACT

For each service topic in the Community Services and Infrastructure impact section, the text presents a summary of methodology used to project future service requirements and the overall service demand for each Mission Bay Alternative. Appendix D. Community Services and Infrastructure, p. XIV.D.1–XIV.D.42, describes public service demand methodologies, assumptions and calculations in detail. The introduction for each service topic also provides future context for service impacts where appropriate, for example, plans for infrastructure expansion that would be in place in the future to serve Mission Bay development or other growth in the City. A specific discussion for the two analysis years, 2000 and 2020, then follows for Alternatives A, B and N, describing service demands; new personnel, buildings or other facilities required; and the ability of agencies to provide such services.

Mitigation measures for each community service are discussed beginning on p. VI.D.115.

FIRE PROTECTION

Service Demand Issues

The projected demands for Fire Department service required to maintain the current level of fire protection in the Mission Bay Project Area for each of the Alternatives for both analysis years would result in increases in fire suppression staffing, equipment and station space needs. As discussed in Appendix D. p. XIV.D.8, the addition of personnel to an engine or truck company without adding equipment or vehicles does not increase the ability of such a company to respond to additional incidents. An entire engine or truck company is needed to increase the level of service.

The addition of a fire company would also increase the demand for management (division, battalion, and deputy chiefs) and administrative (support) services./94/ Increased office and commercial space would increase the demand for services from building inspectors.

The estimated increases in the number of fire and non-fire incidents for each of the land uses proposed in the Alternatives are based on Fire Department incident reports from a sample of sites containing land uses similar to the types under consideration for Mission Bay.

Growth in the number of incidents would increase the demand on fire suppression units (e.g., engine and truck companies) of Battalion 3. The increase in the number of incident responses would directly increase out-of-service time for existing engine and truck companies serving the Project Area. (Out-of service time is the amount of time during which an engine or truck company is responding to fire or non-fire incidents and is not available to respond to other incidents.)/95/ With the closer companies out-of-service more often, there could be an increase in the number of calls within the Project Area and the rest of the Battalion 3 service area that would require response by a more distant company,. thus lengthening response time. Longer response times might allow a fire to engulf a greater area or allow a medical situation to worsen prior to arrival of the first fire unit, thus increasing the possibility of loss of property and loss of life.

Threshold Level of Service

An increased number of incidents can increase out-of-service time for existing fire companies and decrease the level of service provided to the Project Area. The threshold level is the point at which increased out-of-service time results in unacceptable fire response times, whereupon a fire company would need to be added to Battalion 3 to maintain the 1985 level of service in the Project Area. The first three threshold levels, discussed in Appendix D. p. XIV.D.10, are: 1) 80 hours out-of-service would require an engine company, 2) 230 hours out-of-service would require an engine and a truck company, and 3) 635 hours out-of-service would require the addition of two engine companies and one truck company. Because the increase in service demand for any Alternative at full build-out would not exceed 290 hours, only the 80-hour and the 230-hour thresholds would be exceeded in the Project Area.

Water Supply

The relocation or reconstruction of existing high-pressure water lines would not be required under any of the Alternatives.

Station Capacity and Response Times

Battalion 3, serving the Project Area, houses engine and truck companies in four existing stations outside the Project Area. Only Station 29, at 299 Vermont Street near 16th Street, could house an additional company. Future response times for travel into the Project Area would lengthen, primarily due to increased congestion at the intersections serving freeway on- and off-ramps. Ongoing construction that blocked primary access routes could also lengthen response times.

Potential Hazards

New Potential Fire Hazards. During development of the Project Area, an increase in small construction-related fires, such as those set off during welding operations, and construction-related rescue/medical incidents would be expected. As mid-rise buildings replace low-rise buildings, it would become more difficult for firefighting personnel to reach the upper floors, decreasing the ability to control a fire. However, new structures in Mission Bay, built in compliance with the most recent Life Safety Provisions of the San Francisco Building Code, would replace structures generally built under less stringent lower standards, resulting in a higher level of fire safety.

Potential Earthquake Hazards. As with most of San Francisco, a seismic event could block access routes and affect the water systems, decreasing the level of medical, rescue, and fire protection services in the Project Area. As the Project Area is developed, the number of lives and amount of property that could be affected by that damage would increase. More equipment and personnel would be needed to provide emergency services in areas where fire-fighting access and water are limited./96/ That increased commitment could divert services from other areas (see VI.K. Geology and Seismicity, pp.VI.K.35-VI.K.37, for a discussion of seismic hazards).

Hazardous Materials. Light-industrial uses might involve the use of hazardous materials. The proximity of hazardous materials may present a threat to the health of nearby or downwind residents in the event of a fire or other emergency. Such a threat would increase the need for an evacuation plan in the event of a hazardous materials fire./97/

2000

Projections of increased staffing by 2000 for the three alternatives are shown in Table VI.D.1. By that year Alternatives A and B would require new fire companies to maintain service levels in Mission Bay. An increase of less than 1% in the management

TABLE VI.D.1: PROJECT AREA FIRE DEPARTMENT PERSONNEL REQUIREMENTS, BY ALTERNATIVE, 2000 AND 2020/a/

Fire Department Personnel	2000 Alternative A	B	N	2020 Alternative A	B	N	2001-2020 Alternative A	B	N
Engine Company Personnel/b/	15	15	0	15	15	0	+0	+0	+0
Truck Company Personnel/c/	0	0	0	20	20	0	+20	+20	+0
Inspectors	0	0	0	1	0	1	+1	+0	+1
Management/Support Personnel	0	0	0	0	0	0	+0	+0	+0
TOTAL	15	15	0	36	35	1	+21	+20	+1

/a/ The Fire Department personnel requirement in 1985 was not sufficient to require an entire fire company or inspector.
/b/ One engine company requires four officers and 11 firefighters to cover all shifts.
/c/ One truck company requires three officers and 17 firefighters to cover all shifts.

SOURCE: Environmental Science Associates, Inc., based on information provided by the San Francisco Fire Department.

and support services provided during 1985 at the local division, battalion and citywide support levels would be required for all Alternatives; that increase could be met without additional staffing and without reducing the current level of service./96/

The Project Area would be adequately served by the emergency water supply available from the channel and the Bay, and space in existing stations would be adequate to house fire companies serving the areas surrounding the Project Area through 2000./96/

Initial Phase of Development

In the initial phase of development of Alternatives A and B, the increase in the number of fire/non-fire incidents could be handled by existing fire companies without reducing the level of first-response availability for the Project Area on the surrounding areas below an acceptable level. The existing low-pressure/high-pressure water system would be adequate to serve the Project Area, together with the emergency water supply available from China Basin Channel and the Bay./96/

Alternative A

About 310 fire/non-fire incidents per year would be expected to occur in the Project Area in 2000, an increase of about 295 over the 1985 level (see Table VI.D.2). As the area becomes more residential in nature, the proportion of rescue, especially medical, and good-intent calls, (which entail controlled burns, ringing bells, smoke scare and wrong location calls) would increase while the proportion of building fires and hazard calls would decrease. The likelihood of fires reaching the greater alarm stage would be reduced due to citizen alarms; however, with the increase in total population in Mission Bay the possibility of loss of life during a fire would increase.

When Alternative A passes about 4.2 million gross square feet of building area, increased service demand would exceed the 80-hour out-of-service time threshold and would require an engine company with 15 firefighting personnel to maintain the current service level in the Project Area without reducing service to the surrounding areas.

As discussed in VI.I. Architectural Resources and Urban Design, p. VI.I.4, closed Fire Station 30 is of architectural interest and would be preserved and rehabilitated for community service uses in Alternative A. That station, at Third, Fourth and China Basin Streets in Mission Bay, does not meet current structural safety requirements but would be large enough to house a fire company after renovation and could house both an engine and truck company with further renovation and expansion./96/ Alternative A would include about one acre adjacent to closed Station 30 designated for community service uses that would be available as an alternative site for a new fire station by 2000 if Station 30 were preserved for other uses (see Figure V.4, p. V.30).

The proximity of housing to SL/LI/RD uses on Owens Street and 15th Street could, depending on the specific uses, increase the potential of a hazardous materials fire affecting residents; associated emergency personnel for evacuation during such a fire would be required./97/

Although the low-pressure water system would be extended with new development, the existing high-pressure system would not serve the interior of the Project Area, which would limit fire-suppression water supply availability. Fire boat access to the China Basin Channel could be impeded during an approximate two-month period of dredging operations in the channel (during construction of adjacent development)./98/

TABLE VI.D.2: PROJECTED NUMBER OF FIRE AND NON-FIRE INCIDENTS IN THE PROJECT AREA, BY ALTERNATIVE, 1985 AND 2000/a/

	1985	2000 Alternative			1986-2000 Alternative		
Land Use		A	B	N	A	B	N
Office	0	21	15	15	+21	+15	+15
Commercial/b/	0	50	4	7	+50	+4	+7
M-2 Industrial & Port-Related/M-2/c/	0	0	NA	8	+0	NA	+8
Residential/d/	1	215	207	1	+214	+206	+0
Community Facilities & Open Spaces/e/	0	6	5	1	+6	+5	+1
Existing/Remaining/c/	13	3	6	7	-10	-7	-6
Construction/f/	0	15	7	2	+15	+7	+2
TOTAL	14	310	244	41	+296	+230	+27

NA - Not applicable.

/a/ Summary of Appendix D. Table XIV.D.6, p. XIV.D.6, based on incident information provided by the San Francisco Fire Department.
/b/ Includes hotel, retail and S/LI/RD.
/c/ "Existing/Remaining" are M-2 Industrial and port-related types of activities that existed in the Project Area in 1985 and would continue to operate in the Project Area. "M-2 Industrial and Port-Related/M-2" are defined as activities that would develop after 1985.
/d/ Includes houseboats, rentals, owner-occupied and subsidized housing.
/e/ Includes Channel Street Pump Station and CalTrain Station.
/f/ Incidents at construction sites on an annual basis.

SOURCE: Environmental Science Associates, Inc.

Alternative B

About 245 fire/non-fire incidents per year would be expected to occur in the Mission Bay Project Area in 2000, an increase of about 230 over the 1985 level. As with Alternative A, increased residential development would increase the number of calls, particularly for non-fire incidents, and, as a result, the proportion of building fire and hazard calls would decrease. The likelihood of fires reaching a greater alarm stage would be decreased due to early citizen alarms.

The development of about 3.2 million gross square feet of building space in Alternative B by 2000 would increase the out-of-service time over the 80-hour threshold level and would require an engine company with 15 firefighting personnel to maintain current service levels in the Project Area. Due to the higher proportion of housing in Alternative B, the 80-hour threshold would be reached with about one million gross square feet of new development less than Alternative A.

Closed Station 30 would be demolished with Alternative B. A 2.6-acre site would be available in the Third/Fourth Streets area for a new fire station and other community facilities (see Figure V.5, p. V.31).

The existing low-pressure / high-pressure water system and the concurrent extension of the low-pressure water system with new development would serve most of the Project Area adequately in 2000. Development along Owens Street would not be served by the high-pressure system, which would limit fire-suppression water supply availability./96/

Alternative N

About 40 fire/non-fire incidents per year would be expected to occur in the Mission Bay Project Area in 2000, an increase of about 25 over the 1985 level. Because the site would continue primarily as an industrial area, the proportion of incident types would remain about the same. The increased service time would not exceed the 80-hour threshold for a new engine company, and the incidents could be handled by the existing fire companies without reducing the level of first-response availability for the surrounding area below an acceptable level. The low-pressure / high-pressure water system would be adequate to serve the Project Area./96/

Build-Out/2020

When construction is completed, the proportion of incidents involving fires in buildings would decrease and, as the population in the Project Area increases, the proportion of such fires reaching the multiple-alarm stage would also be expected to decrease due to early citizen alarms.

While the need for additional firefighting personnel and equipment would increase further, the demand for managerial and support services at the local division, battalion and citywide levels would increase by less than 3% over 1985 levels for all Alternatives; this demand could be met without additional staffing and without reducing the current level of service./96/

The Fire Department does not anticipate the need in 2020 for additional equipment or staffing to serve the surrounding areas to the south or west of the Mission Bay Project Area (i.e., Potrero Hill and the Inner Mission District). Additional equipment and staff may be required to serve the future development in the Rincon Hill / South of Market area./96/ .

Alternative A

A total of about 770 fire/non-fire incidents per year by 2020 would be expected to occur in the Project Area, about 460 more than 2000 levels and about 750 more than 1985 levels (see Table VI.D.3). As the ratio of residential uses to other uses in the Project Area increases, the proportion of good-intent and rescue calls would also increase while the proportion of building fires and hazard calls would decrease.

Out-of-service time would increase by about 280 hours over the 1985 level and would exceed the 230-hour threshold. Both an engine company, with 15 firefighting personnel, and a truck company, with 20 firefighting personnel, would then have to be added to maintain adequate levels of service in Mission Bay and the surrounding areas. The 230-hour threshold would be reached with the development of about 12 million gross square feet of building space.

In addition to fire suppression personnel, one building inspector would be required when the amount of commercial building space constructed exceeds 8 million gross square feet (see Table VI.D.2, p. VI.D.37).

Although the low-pressure water system would be extended with new development, the existing high-pressure water system would not serve the interior of the Project Area, which would limit fire-suppression water supply availability. The channel and the Bay would not provide an adequate emergency water reserve./96/

TABLE VI.D.3: PROJECTED NUMBER OF FIRE AND NON-FIRE INCIDENTS IN THE PROJECT AREA, BY ALTERNATIVE, 2000 AND 2020/a/

	2000 Alternative			2020 Alternative			2001-2020 Alternative		
Land Use	A	B	N	A	B	N	A	B	N
Office	21	15	15	61	15	15	+40	+0	+0
Commercial/b/	50	4	7	130	42	10	+80	+38	+3
M-2 Industrial & Port-Related/M-2/c/	0	0	8	0	0	88	+0	+0	+80
Residential/d/	215	207	1	567	736	1	+352	+529	+0
Community Facilities & Open Spaces/e/	6	5	1	13	26	4	+7	+21	+3
Existing/Remaining/c/	3	6	7	0	0	0	-3	-6	-7
Construction/f/	15	7	2	0	0	0	-15	-7	-2
TOTAL	310	244	41	771	819	118	+461	+575	+77

/a/ Summary of Appendix D. Table XIV.D.6, p. XIV.D.6.

/b/ Includes hotel, retail and S/LI/RD.

/c/ For 2000, "Existing/Remaining" are M-2 Industrial and port-related types of activities that existed in the Project Area in 1985 and would continue to operate in the Project Area. For 2020, "M-2 Industrial and Port-Related/M-2" includes both activities that would develop after 1985 and activities that are categorized as "Existing/Remaining" in 2000.

/d/ Includes houseboats, rentals, owner-occupied and subsidized housing.

/e/ Includes Channel Street Pump Station and CalTrain Station.

/f/ Incidents at construction sites on an annual basis. No construction during the build-out year since by definition, all development would have been completed.

SOURCE: Environmental Science Associates, Inc., based on information provided by the San Francisco Fire Department.

Alternative B

In 2020, about 820 fire/non-fire incidents per year would be expected to occur in the Project Area, about 580 more than 2000 levels and about 800 over 1985 levels. As in Alternative A, as the ratio of residential uses to other uses in the Project Area increases, the proportion of good intent and rescue calls would continue to increase while the proportion of building fires and hazard calls would decrease. Out-of-service time would increase by about 280 hours over the 1985 level and would exceed the 230-hour threshold.

Both an engine company, with 15 firefighting personnel, and a truck company, with 20 firefighting personnel, would then have to be added to maintain adequate levels of service in Mission Bay and the surrounding areas. The 230-hour threshold would be reached with the development of about 9 million gross square feet of building space.

Although the low-pressure water system would be extended with new development, the existing high-pressure water system would not serve the interior of the Project Area, which would limit fire-suppression water supply availability. The channel and the Bay would provide an adequate emergency water reserve./96/

Alternative N

About 120 fire/non-fire incidents per year by 2020 would be expected to occur in the Project Area, about 80 more than in 2000 and about 100 above the 1985 levels. As in 2000, the primary industrial service use of this Alternative would continue and the nature of the incidents would remain unchanged. Out-of-service time would not exceed the 80-hour threshold for a new engine company and the incidents could be handled by the existing fire companies without reducing the level of first-response availability for the surrounding area below an acceptable level.

As in Alternative A, one building inspector would be required when the amount of commercial building space exceeds 8 million gross square feet.

The existing high-pressure water system would not be adequate to serve the interior portion of the Project Area. However, the channel and the Bay would provide an adequate emergency water supply./96/

POLICE PROTECTION

Service Demand Issues

The projected demands for police services and associated staffing required to maintain the current city-wide level of police protection in the Project Area for both analysis years were calculated for each of the Alternatives using a two-part procedure./99/

First, an estimate of the number of police incidents was derived from police incident/land use ratios, and per capita police incident ratios in areas surrounding Mission Bay (see Table VI.D.4)./100/ The estimated increase in the number of incidents generated by the Alternatives would require additional personnel and equipment to maintain the current level of service in the Project Area./101/ The estimated number of additional police personnel for each Alternative is presented in Table VI.D.5, p. VI.D.44./102/ See Appendix D. Community Services and Infrastructure, p. XIV.D.15, for further discussion of the analysis method.

During construction a relatively high number of traffic-related accidents would be expected due to poorly surfaced streets which lack sidewalks and painted crosswalks. Areas adjacent to sites under construction with relatively poor lighting and low population densities would tend to experience relatively high levels of non-domestic crime. Construction activity also increases the ability of criminals to loiter in an area undetected and carry potential entry tools without arousing suspicion. As a result, areas adjacent to construction sites could experience an increase in theft and vandalism./103/ Construction activity, especially cleaning up the edges of the China Basin Channel during the dredging operations, would displace local transients./104/

With the easy access to and from I-280, vehicle grand theft would continue to be a problem but would account for a smaller proportion of criminal incidents than in 1985. The majority of the crimes in the Project Area would tend to be committed by people from outside the community, except for domestic violence. Most criminal activity would be expected to occur outside residences between the hours of 2:00 p.m. and 10:00 p.m./105/ New buildings in the Project Area would replace older structures. These new buildings would have better security systems and design. The number of police incidents per square foot for these new buildings would therefore be less than that in the existing buildings./103/ However, because the density of development would be higher than existing conditions for all Alternatives, there would be an increase in the number of expected incidents.

If additional police staffing were not provided as service demands in the Project Area increased, police would need to be diverted from other areas of San Francisco. That would reduce overall coverage and increase response times and police case loads, resulting in an increase in criminal incidents and the number of unsolved crimes. The entire City could receive a reduced level of police protection./104/

TABLE VI.D.4: PROJECTED NUMBER OF POLICE INCIDENTS IN THE PROJECT AREA, BY ALTERNATIVE, 1985 AND 2000/a/

		2000 Alternative			1986-2000 Alternative		
Land Use	1985	A	B	N	A	B	N
Office	0	105	75	75	+105	+75	+75
Commercial/b/	0	210	5	5	+210	+5	+5
M-2 Industrial & Port-Related/M-2	0	0	0	75	0	0	+75
Residential/c/	5	850	830	5	+845	+825	+0
Community Facilities & Open Spaces/d/	0	105	60	0	+105	+60	+0
Existing/Remaining/e/	295	75	90	265	-220	-205	-30
Construction/f/	0	380	180	40	+380	+180	+40
TOTAL	300	1,725	1,240	465	+1,425	+940	+165

/a/ Summary of Appendix D. Table XIV.D.19, p. XIV.D.21.
/b/ Includes hotel, retail and S/LI/RD.
/c/ Includes houseboats, rentals, owner-occupied and subsidized housing.
/d/ Includes Channel Street Pump Station and CalTrain Station.
/e/ "Existing/Remaining" are M-2 Industrial and port-related types of activities that existed in the Project Area in 1985 and would continue to operate in the Project Area. "M-2 Industrial and Port-Related/M-2" are defined as activities that would develop after 1985.
/f/ Incidents occurring at construction sites on an annual basis.

SOURCE: Environmental Science Associates, Inc., based on information provided by the San Francisco Police Department.

Police Stations

Existing and planned police stations serving Mission Bay (Southern and Potrero Stations) could not house the additional personnel required for Mission Bay development under current space standards./106,107/ In addition to building space, parking for police, employee and visitor vehicles would be required.

Community involvement in crime prevention is influenced by the accessibility of the police./103/ The distance of the stations from the Project Area (about one mile northwest from the center of the Project Area to the Southern Station and about three miles south to the new Potrero Station) and the lack of adequate parking and lack of

TABLE VI.D.5: ESTIMATED PROJECT AREA POLICE DEPARTMENT PERSONNEL REQUIREMENTS, BY ALTERNATIVE, 1985, 2000 AND 2020

		2000 Alternative			2020 Alternative		
Police Personnel	1985	A	B	N	A	B	N
Patrol Personnel	7	24	18	9	43	44	16
Investigative Personnel	–	4	3	1	8	9	2
Traffic Personnel	–	4	3	1	9	10	2
Support Personnel/a/	2	13	10	4	25	27	7
TOTAL	9	45	34	15	85	90	27

/a/ Includes civilians.

SOURCE: Environmental Science Associates, Inc., based on information provided by the San Francisco Police Department.

community meeting space at the Southern Station could limit the Mission Bay community's access to the police, and result in a low level of community involvement in crime prevention.

Potential Earthquake Hazards

During a major earthquake, damage to the I-280 freeway and the channel bridges could cut off direct access from the north and west between the Project Area and the Southern Station, limiting emergency access to that available from the south, and lengthening response time (see VI.K. Geology and Seismicity, p. VI.K.37, for a discussion of seismic hazards).

2000

With the exception of intersections along King Street during the PM rush hour, routine response by units patrolling within the Project Area would not be significantly affected by increased traffic resulting from Mission Bay development, although ongoing construction that blocked primary access routes could lengthen response times. Instead, response time from police facilities located outside the Project Area would be lengthened, primarily due to increased congestion at the intersections serving freeway on- and off-ramps./108/

Alternative A

By the year 2000, about 1,725 police incidents per year would be expected to occur in the Mission Bay Project Area, an increase of about 1,425 over 1985 levels. With an increase in residential units, the proportion of commercial burglaries and commercial theft would decrease as the proportion of residential burglary and domestic violence rises. In addition, the high proportion of new business and nearby construction activity would likely cause an increase in the number and proportion of false alarms.

Maintaining the current service level in the Project Area to respond to the increased number of incidents would require about 36 additional police personnel and three squad cars by 2000. The additional police personnel would require approximately 4,320 square feet of building space./109/ That amount of space does not exist in either the existing Southern or Potrero district stations nor in the new Potrero station to be funded under the 1987 Police Bond Proposal./104/

Initial Phase of Development. During the initial phase of development under Alternative A, the first major change in criminal activity would be an increase in construction-related thefts and vandalism, followed by an increase in burglaries and thefts as new structures are occupied. An increase of about five patrol officers would be required to maintain the current level of service. Additional officers could operate out of the existing Southern Station, although it is overcrowded. On-going construction that blocked primary access routes could lengthen police response times.

Alternative B

About 1,240 police incidents per year would be expected to occur in the Project Area in 2000, an increase of about 940 over 1985 levels. The nature of the incidents would be similar to those in Alternative A but, with less office, S/LI/RD and retail development, the proportion of commercial theft and shoplifting activities would be somewhat lower, with most criminal activity related to residential uses (such as burglary).

Maintaining the current service level in the Project Area by 2000 would require the addition of about 25 police personnel and two squad cars by 2000. Additional police personnel would require approximately 3,000 square feet of building space. As in

Alternative A, that amount of additional space could not be provided in the existing Southern or Potrero district stations nor in the new Potrero Station planned under the approved 1987 Police Bond Proposal./104/

Initial Phase of Development. Impacts on police services during the initial phase of Alternative B would be similar in type but less than those for Alternative A. Two additional patrol officers would be required to maintain the current level of service.

Alternative N

About 465 police incidents per year would be expected to occur in the Project Area in 2000, an increase of about 165 over 1985 levels. Because the site would continue primarily as an industrial area, the nature of the criminal activity would remain dominated by commercial theft and commercial burglary, with auto theft playing a smaller role than it did in 1985./110/.

Maintaining the current service level in the Project Area would require the addition of about six police officers, who could operate out of the Southern District station although it is already overcrowded./104/

Build-Out/2020

At build-out, construction would be completed, therefore eliminating construction-related crime and traffic problems. Overall, there would be a slight drop in traffic-related accidents as all the streets would be lighted, sidewalks completed and crosswalks painted. Any remaining transients could relocate near the piers and under the I-280 freeway, away from new development. With the exceptions of the intersections along King Street and signalized freeway access points during the PM rush hour, which would slow response time, routine response by units patrolling in the Project Area would not be substantially affected by increased traffic, but response times from units outside the Project Area would be substantially affected by congestion at intersections serving freeway on- and off-ramps./103/ However, development in the Project Area with the Alternatives would increase the number of incidents and need for police personnel which could not be accommodated in existing police stations.

The Police Department does not anticipate a substantial increase in the demand for police services in the areas to the south or west of the Mission Bay Project Area (i.e., Potrero

Hill and Inner Mission District). Increased demands are expected in the Rincon Hill/South of Market area associated with new commercial and residential development there./110/

Alternative A

About 3,280 police incidents per year would be expected in the Project Area, an increase of about 3,000 over 1985 levels and 1,550 over 2000 levels (see Table VI.D.6).

TABLE VI.D.6: PROJECTED NUMBER OF POLICE INCIDENTS IN THE PROJECT AREA, 2000 AND 2020/a/

	2000 Alternative			2020 Alternative			2001-2020 Alternative		
Land Use	A	B	N	A	B	N	A	B	N
Office	105	75	75	300	75	75	+195	+0	+0
Commercial/b/	210	5	5	535	90	5	+325	+85	+0
M-2 Industrial & Port-Related/M-2/c/	0	0	75	0	0	805	+0	+0	+730
Residential/d/	850	830	5	2,305	2,995	5	+1,455	+2,165	+0
Community Facilities & Open Spaces/e/	105	60	0	140	235	10	+35	+175	+10
Existing/Remaining/c/	75	90	265	0	0	0	-75	-90	-265
Construction/f/	380	180	40	0	0	0	-380	-180	-40
TOTAL	1,725	1,240	465	3,280	3,395	900	+1,555	+2,155	+435

/a/ Summary of Appendix D. Table XIV.D.19, p. XIV.D.21.

/b/ Includes hotel, retail and S/LI/RD.

/c/ For 2000, "Existing/Remaining" are M-2 Industrial and port-related types of activities that existed in the Project Area in 1985 and would continue to operate in the Project Area. For 2020, "M-2 Industrial and Port-Related/M-2" includes both activities that would develop after 1985 and activities that are categorized as "Existing/Remaining" in 2000.

/d/ Includes houseboats, rentals, owner-occupied and subsidized housing.

/e/ Includes Channel Street Pump Station and CalTrain Station.

/f/ Incidents occurring at construction sites on an annual basis. No construction during the build-out year since by definition, all development would have been completed.

SOURCE: Environmental Science Associates, Inc., based on information provided by the San Francisco Police Department.

Maintaining the current service level in the Project Area would require about 76 police personnel and six squad cars above the 1985 level and 40 personnel and three squad cars more than the 2000 level. The 76 additional police personnel would require approximately 9,100 square feet of additional building space above 1985 requirements.

Alternative B

By 2020, about 3,395 police incidents per year would be expected to occur in the Project Area, an increase of about 3,095 over 1985 levels and 2,155 over 2000 levels. The number of incidents would be about 3% higher than the number of incidents in Alternative A due to the different mix of land uses (i.e., less office space development and a larger residential population in Alternative B). Compared to Alternative A, more domestic violence and residential burglary incidents and fewer commercial burglaries and thefts would be expected due to the greater proportion of residential uses in Alternative B. The wetlands areas could provide a gathering place for transients./104/

Maintaining the current service level in the Project Area by 2020 would require the addition of about 81 police personnel and six squad cars over the 1985 level and 56 personnel and four squad cars over the 2000 level. The additional police personnel would require approximately 9,700 square feet of building space above the 1985 space requirements.

Alternative N

About 900 police incidents per year would be expected to occur in the Mission Bay Project Area, an increase of about 625 over 1985 levels and about 435 over 2000 levels. The nature of the criminal activity would remain about the same, dominated by commercial theft, commercial burglary and auto theft.

Maintaining the current service level in the Project Area would require the addition of about 18 police personnel and one squad car over the 1985 level and 12 personnel and one squad car over the 2000 level. The additional police personnel would require approximately 2,200 square feet of building space.

SCHOOLS

2000

Public School Enrollment Citywide

Total SFUSD enrollment during the 1985-1986 school year was approximately 63,400 students, about 9% of the City's total 1985 population of about 741,500. California Department of Finance projections also show that about 9% of the City's total population would continue in the year 2000 to be expected to attend public schools./111/ Applying this percentage to the estimates of year 2000 citywide population, including Mission Bay (see VI.C. Housing and Population, p. VI.C.39), yields an estimated total SFUSD enrollment in 2000 of about 70,700 students under Alternatives A and B, and about 70,400 students under Alternative N. That citywide enrollment growth of about 7,000 to 7,300 students between 1985 and 2000 would be an 11% increase over the 15-year period.

The projected enrollment growth would result from several factors/112/: In recent years, the district has been retaining a higher percentage of its students as fewer students are transferring to private schools, moving out of the district, or dropping out of school; new housing developed in the City, including possible military housing, will bring new students to the district; and the district is expected to continue to receive large numbers of new foreign-born immigrants with needs for special programs in English as a second language./112/

The following analysis is based on long-term population and public school enrollment projections. While the projections are based on the best sources of information available, it is not possible to forecast with certainty exact enrollment levels years into the future. Long-term projections can be insensitive to short-term fluctuations in demographic patterns; actual school space and staff needs may not correspond exactly with estimates presented here. The projections provide a reasonable basis for generally identifying potential future needs.

As presented in Appendix D. Table XIV.D.22, p. XIV.D.24, the district operated at about 95% of capacity in 1985-1986, with space available in existing schools for about 3,300 additional students in grades kindergarten through 12 (K-12). That residual capacity would be absorbed by year 2000 by the estimated district-wide enrollment growth of about 7,000 students under Alternative N, and 7,300 students under Alternatives A and B./113/ Under Alternatives A and B, there would be a shortfall of space for about 3,970 students (1,590 elementary, 910 middle and 1,470 high school students, based on the grade level distribution estimated for the year 2000/114/). Under Alternative N, there would be a shortfall of space for about 3,670 students (1,465 elementary, 845 middle and 1,360 high school students) (see Appendix D. Table XIV.D.25, pp. XIV.D.28-XIV.D.29).

Public School Students Living in Adjacent Nearby Areas

To provide a context for assessing Mission Bay schools impacts, this section discusses estimates of future levels of public school students living in the neighborhoods surrounding the Project Area. Those neighborhoods include the Nearby Areas of South of Market, Inner Mission, Potrero Hill, Lower Potrero Hill and the southern part of Central Bayfront./115/ Taken together, they form the "adjacent Nearby Areas." Appendix D. Table XIV.D.26, p. XIV.D.30, shows that SFUSD enrollment of students who live in adjacent Nearby Areas could increase by about 490 students, or 6%, from about 8,670 in 1985 to about 9,160 in the year 2000./116/ Based on the grade level distribution estimated for the year 2000, about 3,660 of these 9,160 students would be elementary school students, 2,110 would be middle school students, and 3,390 would be high school students./114/ Most of the increase would occur in South of Market, due largely to expected residential growth in Rincon Hill and South Beach.

Public Schools Located in Nearby Areas Adjacent to Mission Bay

Enrollment in school facilities located in the adjacent Nearby Areas is not a direct function of the enrollment originating from those areas. That is due to district-wide open enrollment policies of the City's alternative elementary schools and most of the high schools, as well as integration programs that assign students who live in particular attendance areas to schools in other neighborhoods. However, because elementary schools generally are located in areas where concentrations of elementary school children live, it is appropriate to compare expected elementary school enrollment originating from the adjacent Nearby Areas to the capacity of existing elementary schools in those areas. (Such a comparison is not appropriate for middle and high schools because middle schools have expansive attendance areas and most high schools have district-wide enrollment.) In addition to the Project Area students (discussed below), about 3,660 elementary school students are projected to live in the adjacent Nearby Areas in the year 2000 under all alternatives. In comparison, the existing elementary schools in those areas can accommodate about 3,100 students (see Appendix D. Table XIV.D.24, p. VI.D.27), indicating a shortfall of space for about 560 students (or about 35% of the citywide elementary school space shortfall estimated for year 2000), not including Mission Bay students (see Appendix D. Table XIV.D.25, pp. XIV.D.28–XIV.D.29).

Project Area Public School Students and Space and Teacher Requirements

Based on the forecast of Project Area population (see Chapter V. The EIR Alternatives and Approval Process, pp. V.38–V.40), and an estimate of its age distribution in the year 2000, estimates of Project Area school-aged children were developed./117/ Existing public school participation rates were applied to the estimates of school-aged children to estimate the public school students who would live in the Project Area for each Alternative./118/ Table VI.D.7 presents those estimates for each Alternative in the year 2000.

As Table VI.D.7 shows, about 600 SFUSD students under Alternative A, 550 under Alternative B and about three under Alternative N would live in the Project Area in the year 2000. In comparison to these future enrollment levels, only two school-aged children currently reside in the Project Area. Those children are residents of the houseboat community on China Basin Channel; both attend private schools. Table VI.D.7 also compares Project Area public school students to citywide public school enrollment in the year 2000, showing that Project Area enrollment would represent less than 1% of total City enrollment under Alternatives A and B, and a fraction of that under Alternative N./119/

Table VI.D.8, p. VI.D.53 shows the classroom, school and teacher requirements associated with serving Project Area public school students in the year 2000 under Alternatives A and B; Table VI.D.8 also presents the space needed to serve Project Area public school students as a percentage of a typical school. The number of teachers required was calculated using the existing SFUSD ratio of about one teacher per 16 students; that ratio includes all certified personnel, including principals, counselors, classroom teachers, and resource teachers./120/ Table VI.D.8 does not present space or teacher requirements for Alternative N because, as virtually no more students are projected to live in the Project Area under this Alternative than lived there in 1985, there would be no impact on SFUSD.

TABLE VI.D.7: ESTIMATES OF PROJECT AREA PUBLIC SCHOOL STUDENTS BY GRADE LEVEL AND COMPARISON TO CITYWIDE PUBLIC SCHOOL ENROLLMENT, BY ALTERNATIVE, 2000/a/

	2000		
	Alternative A	Alternative B	Alternative N
Kindergarten-Grade 5	256	229	1
Grades 6-8	149	133	1
Grades 9-12	211	195	1
TOTAL MISSION BAY	616 (0.9%)	557 (0.8%)/b/	3 (0.0%)
TOTAL CITYWIDE	70,700 (100%)	70,700 (100%)	70,400 (100%)

/a/ Estimates of Project Area public school students are based on estimates of total school-aged children in the Project Area in the year 2000 (see Appendix D., Table XIV.D.27, p. XIV.D.??). About 72% of total students in grades K-8 and 78% of those in grades 9-12 would attend public schools, while the remainder would attend private schools.

/b/ By the year 2000 more housing would be developed in Alternative A than in Alternative B, resulting in more public school students than Alternative B. At build-out/2020, Alternative B would have more housing and public school students than Alternative A.

SOURCE: Environmental Science Associates, Inc.

Alternative A

By the year 2000, adjacent Nearby Area schools and the district as a whole would not be expected to have sufficient space to accommodate any of the Mission Bay public school students. The approximately 600 SFUSD students from the Project Area would require about nine elementary classrooms, five middle school classrooms and eight high school classrooms based on current SFUSD space standards. Those students would comprise about 60% of a typical SFUSD elementary school enrollment, 18% of a middle school and 12% of a high school. About 38 teachers and staff would be needed.

By the year 2000, there would be about 250 Mission Bay elementary students and about 560 elementary school students in the adjacent Nearby Areas for whom there would not be space; that would result in the cumulative need for about two typical elementary schools in the Project Area and adjacent Nearby Areas. There would also be a projected citywide shortfall of space for about 4,000 students, including Mission Bay students (see p. VI.D.50),

TABLE VI.D.8: ESTIMATED CLASSROOMS, SCHOOLS AND TEACHERS/STAFF REQUIRED TO SERVE PROJECT AREA PUBLIC SCHOOL STUDENTS, ALTERNATIVES A AND B, 2000/a/

	Alternative A			Alternative B		
Grade Level	Classrooms/b/	Schools/c/	Teachers/Staff/d/	Classrooms/b/	Schools/c/	Teachers/Staff/d/
Kindergarten-Grade 5 (Elementary)	9	57%	16	8	51%	14
Grades 6-8 (Middle)	5	18%	9	5	16%	8
Grades 9-12 (High)	8	12%	13	7	11%	12
TOTAL	22		38	20		34

/a/ Because only about three SFUSD students are projected to live in the Project Area in the year 2000 under Alternative N, calculation of space or teacher requirements would not be statistically meaningful.

/b/ Classroom requirements estimated using a SFUSD standard of 27 students per classroom.

/c/ School requirements estimated using the following typical school sizes: elementary school: 450 students; middle school: 850 students; high school: 1,750 students. Figures presented as percentages for a typical facility that Project Area students would occupy.

/d/ Teacher/staff requirements estimated using 1985-86 ratio of one teacher/staff member per 16 students. The teacher and staff ratio accounts for all certified SFUSD personnel, including principals, counselors, and resource teachers, as well as classroom teachers.

SOURCE: Environmental Science Associates, Inc.

that would indicate the need for about 3.5 elementary schools, an additional middle school and about 85% of a high school in the year 2000. The approximately 600 Mission Bay K-12 students would represent about 15% of total students citywide who might not be accommodated within existing schools (see Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29).

Initial Phase of Development. The approximately 115 potential SFUSD students from the Project Area under Alternative A would be absorbed by the residual capacity of schools in adjacent Nearby Areas and other areas in the district.

Alternative B

By the year 2000, existing schools would not have sufficient space to accommodate any of the Project Area public school students. About 550 students therefore would require almost as many classrooms as under Alternative A, about eight elementary, five middle and seven high school classrooms. Those students would comprise about half of a typical SFUSD elementary school enrollment, 16% of a middle school and 11% of a high school. About 34 teachers would be needed.

As under Alternative A, the need for elementary school space generated by Mission Bay plus the space shortfall projected for the adjacent Nearby Areas would result in the cumulative need for about two elementary schools in the Project Area and adjacent Nearby Areas. The potential district-wide need for additional classroom space under Alternative B would be the same as that under Alternative A. The space needs of Mission Bay K-12 students would represent about 14% of the projected Citywide shortfall of space (see Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29).

Initial Phase of Development. About 90 SFUSD students from the Project Area under Alternative B would be absorbed by existing schools.

Alternative N

The number of students projected to live in the houseboats in the Project Area in the year 2000 under Alternative N would be similar to the number living there in 1985; because no new housing would be built at Mission Bay, there would be no impact on SFUSD.

Under Alternative N, there would be a need for about one and one-fourth additional elementary schools due to potential population growth in the adjacent Nearby Areas. District-wide enrollment growth would generate a need for about three elementary schools, one middle school and 78% of a high school (see Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29).

Build-Out/2020

Public School Enrollment Citywide

Between 2001 and 2020, potential citywide SFUSD enrollment is estimated to grow by about 4,000 students (5.6%) under Alternative A, from about 70,700 to 74,700 students. Under Alternative B, it would grow by about 4,500 students (6.4%) from about 70,700 students in the year 2000 to about 75,200 students in the year 2020. Under Alternative N, total enrollment would grow by about 3,200 students (4.5%) from about 70,400 students in the year 2000 to 73,600 students in the year 2020. Between 1985 and 2020, enrollment would increase from about 63,400 by about 10,200 under Alternative N, 11,300 under Alternative A and 11,800 under Alternative B. That citywide growth would represent a 16% to 19% increase over the 35-year period between 1986 and 2020.

As stated above, existing SFUSD capacity to accommodate about 3,300 additional students would be absorbed by district-wide enrollment growth by the year 2000. Further growth between 2001 and 2020 therefore would not be housed in the district's current capacity. Under Alternative A there would be a shortfall of space for about 7,970 students (3,745 elementary, 1,755 middle and 2,470 high school students, based on the grade level distribution estimated for the year 2020/114/). Under Alternative B, there would be a shortfall of space for about 8,470 students (3,980 elementary, 1,865 middle and 2,625 high school students). Under Alternative N, there would be a shortfall of space for about 6,870 students (3,230 elementary, 1,510 middle and 2,130 high school students) (see Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29).

Public School Students Living in Adjacent Nearby Areas

Appendix D. Table XIV.D.26, p. XIV.D.30, shows that SFUSD enrollment of students who live in adjacent Nearby Areas is estimated to increase by about 540 students, or 6%, from about 9,160 in the year 2000 to about 9,700 in the year 2020./116/ Based on the grade level distribution estimated for the year 2020, about 4,560 would be elementary school students, 2,135 would be middle school students, and 3,005 would be high school students./114/ As would be the case for the year 2000, most of the increase would be attributable to expected residential growth from Rincon Hill and South Beach.

In addition to Project Area students (discussed below), about an estimated 4,560 elementary school students would live in the adjacent Nearby Areas in the year 2020 under all Alternatives. In comparison, existing elementary schools in those areas can accommodate about 3,100 students (see Appendix D. Table XIV.D.24, p. XIV.D.27), indicating a potential shortfall of space for about 1,460 students (or about 35% to 45% of the citywide elementary school space shortfall estimated for year 2020) (see Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29).

Project Area Public School Students and Space and Teacher Requirements

Estimates of Project Area public school children in the year 2020 were developed using the same approach as for the year 2000./121/ Those estimates are presented for each Alternative in Table VI.D.9. About 1,450 students under Alternative A, 1,900 under Alternative B and about three under Alternative N would live in the Project Area in the year 2020. Table VI.D.9 also shows Project Area enrollment growth estimated to occur between 2000 and 2020.

Table VI.D.9 compares year 2020 estimates of Project Area public school students to estimated citywide enrollment in the year 2020. Project Area enrollment would represent about 2% of citywide enrollment under Alternative A and 2.5% under Alternative B. Because no new housing would be built, Project Area enrollment under Alternative N would remain a small fraction of citywide enrollment./122/

Table VI.D.10, p. VI.D.58, shows the potential classroom, school and teacher requirements associated with serving estimated Project Area public school students in the year 2020 under Alternatives A and B. (Alternative N would have no impact on SFUSD.) Table VI.D.10 also shows additional space and teachers needed by the year 2020 over those needed in 2000.

Alternative A

Approximately 1,450 SFUSD students are projected to live in the Project Area under Alternative A in the year 2020. Existing schools in the adjacent Nearby Areas and the

TABLE VI.D.9: ESTIMATES OF PROJECT AREA PUBLIC SCHOOL STUDENTS BY GRADE LEVEL AND COMPARISON TO CITYWIDE PUBLIC SCHOOL ENROLLMENT, BY ALTERNATIVE, 2000 AND BUILD-OUT/2020/a/

	Alternative A			Alternative B			Alternative N		
Grade Level	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
Kindergarten-Grade 5 (Elementary)	256	673	+417	229	870	+641	1	1	+0
Grades 6-8 (Middle)	149	323	+174	133	418	+285	1	1	+0
Grades 9-12 (High)	211	450	+239	195	584	+389	1	1	+0
TOTAL Mission Bay	616 (0.9%)	1,446 (2.0%)	+830	557 (0.8%)	1,872 (2.5%)	+1,315	3 (0.0%)	3 (0.0%)	+0
Citywide, Under Each Alternative	70,700 (100%)	74,700 (100%)	+4,000	70,700 (100%)	75,200 (100%)	+4,500	70,400 (100%)	73,600 (100%)	+3,200

/a/ Estimates of Project Area public school students are based on estimates of total school-aged children in the Project Area in the years 2000 and 2020 (see Appendix D, Table XIV.D.26 and Table XIV.D.27, pp. XIV.D.30 and XIV.D.31). Based on SFUSD information for the existing proportions of school-age children who attend public schools and private schools, about 72% of total students in grades K-8 and 78% of those in grades 9-12 would attend public schools, while the remainder would attend private schools (SFUSD, "Non-Public Ethnic Summary by Census Tract," computer print-out, October 28, 1985).

SOURCE: Environmental Science Associates, Inc.

TABLE VI.D.10: ESTIMATED CLASSROOMS, SCHOOLS AND TEACHERS/STAFF REQUIRED TO SERVE PROJECT AREA PUBLIC SCHOOL STUDENTS, ALTERNATIVES A AND B, 2000 AND BUILD-OUT/2020/a/

	Alternative A								
	2000			2020			2001-2020		
Grade Level	Classrooms/b/	Schools/c/	Teachers/Staff/d/	Classrooms/b/	Schools/c/	Teachers/Staff/d/	Classrooms/b/	Schools/c/	Teachers/Staff/d/
Kindergarten-Grade 5 (Elementary)	9	15%	16	25	150%	42	+16	+93%	+25
Grades 6-8 (Middle)	5	18%	9	12	40%	20	+7	+22%	+11
Grades 9-12 (High)	8	12%	13	16	26%	28	+ 8	+14%	+15
TOTAL	22		38	53		90	+31		+51
	Alternative B								
	2000			2020			2001-2020		
	Classrooms/b/	Schools/c/	Teachers/Staff/d/	Classrooms/b/	Schools/c/	Teachers/Staff/d/	Classrooms/b/	Schools/c/	Teachers/Staff/d/
Kindergarten-Grade 5 (Elementary)	8	51%	14	32	190%	54	+24	+139%	+40
Grades 6-8 (Middle)	5	16%	8	15	50%	26	+10	+34%	+18
Grades 9-12 (High)	7	11%	12	21	33%	36	+14	+22%	+24
TOTAL	20		34	68		116	+48		+82

/a/ Because about three SFUSD students are projected to live in the Project Area in 2000 and in 2020 under Alternative N, they would not have significant space or teacher requirements.

/b/ Classroom requirements estimated using a SFUSD standard of 27 students per classroom.

/c/ School requirements estimated using the following typical school sizes: elementary school: 450 students; middle school: 850 students; high school: 1,750 students. Figures presented as percentages for a typical facility that Project Area students would occupy.

/d/ Teacher/staff requirements estimated using 1985-86 ratio of one teacher/staff member per 16 students. The teacher/staff ratio accounts for all certified SFUSD personnel, including principals, counselors, and resource teachers, as well as classroom teachers.

SOURCE: Environmental Science Associates, Inc.

district as a whole would not have sufficient space to accommodate any of those students. Project Area students would require about 25 elementary classrooms, 12 middle-school classrooms and 16 high-school classrooms. They would represent about one and one-half typical elementary schools, 40% of a middle school and 26% of a high school. About 90 teachers would be needed.

By the year 2020, there would be about 675 Mission Bay elementary students and about 1,460 elementary school students in the adjacent Nearby Areas for whom there would not be space; that would result in the cumulative need for about five typical elementary schools in the Project Area and adjacent Nearby Areas. There would also be a projected citywide shortfall of space for about 8,000 students, including Mission Bay students (see p. VI.D.55); that would indicate the need for about eight additional elementary schools, two middle schools and one and one-half high schools citywide in the year 2020. Mission Bay K-12 students could represent about 18% of the total students citywide who would not be accommodated within existing schools (see Appendix D. Table XIV.D.25. p. XIV.D.28-XIV.D.29).

Alternative B

Under Alternative B, about 1,900 public school students are projected to live in the Project Area, about 450 (30%) more than under Alternative A. As under Alternative A, existing schools in the adjacent Nearby Areas and the district as a whole would not have sufficient space to accommodate any of those students. They would require about 32 elementary, 15 middle and 21 high school classrooms, or 15 more classrooms than under Alternative A. They would represent almost two elementary schools, half of a middle school and a third of a high school. About 116 teachers/staff would be needed.

The need for elementary school space for about 870 students generated by Mission Bay plus the projected shortfall of space for about 1,460 elementary school students in the adjacent Nearby Areas would result in the cumulative need for about five typical elementary schools in the Project Area and adjacent Nearby Areas. The district-wide need (including the need generated by Mission Bay) for additional school space would be slightly higher than under Alternative A. About nine elementary schools, two middle schools and one and one-half high schools would be needed. The space needs of Project Area students (K-12) would represent about 22% of the projected citywide shortfall of space (see Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29).

Alternative N

As would be the case for the year 2000, the number of students projected to live in the houseboats in the Project Area under Alternative N in the year 2020 would not differ from the number who lived there in 1985. Because no new housing would be developed at Mission Bay, there would be no impact on SFUSD.

Enrollment growth without Mission Bay would generate the need for about 3.2 additional elementary schools in the adjacent Nearby Areas. Citywide enrollment growth would require about seven elementary schools, 1.8 middle schools and one high school (see Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29).

Project Area School Locations

Alternative A

Alternative A would include several locations for community facilities (see Figure V.1, p. V.12). The 1.5-acre site east of Third Street of the intersection of Third and Mission Rock Streets might be suitable for consideration as a school site. That site could accommodate a typical elementary school (450 students), middle school (850 students) or an alternative high school (about 850 students). It would not be large enough to accommodate a typical comprehensive high school (1,750 students) that provides a full curriculum program. It would be a small middle or alternative high school site compared to typical sites in the City, but would be sufficient because the adjacent 14.6-acre park could serve the students' open space and recreation needs. The site would have good access from the Third Street transportation corridor. A school at that location could pose potential land use compatibility problems with the proposed 3.5-acre hotel. Other community facilities locations identified in Alternative A, at the south side of Mission Rock Street east of Third Street (0.5 acre) and near the two-acre central square (two sites, each 0.2 acre), would not accommodate typical schools.

Alternative B

Three locations for community facilities are identified in Alternative B (see Figure V.2, p. V.14). The 0.8-acre site at Owens north of 16th Street might accommodate a typical elementary school (450 students), but would be smaller than the one-acre standard for

SFUSD elementary campuses./120/ The 2.2-acre site at Owens Street south of 16th Street would be large enough for a typical elementary school, but not for a middle school or high school, as there would be no adjoining open space. Both sites on 16th Street would require or encourage students to cross the CalTrain grade crossing at 16th Street. It is SFUSD policy to avoid school assignments that would require students to use railroad grade crossing./120/ The 2.6-acre community facilities site at Third and Fourth Streets could accommodate a typical elementary school, and therefore that site would also be large enough for a typical middle school or alternative high school, as it would be about 300 feet from the 13.2-acre central open space area that could provide student recreation areas. The site would have good access from the Third Street transportation corridor.

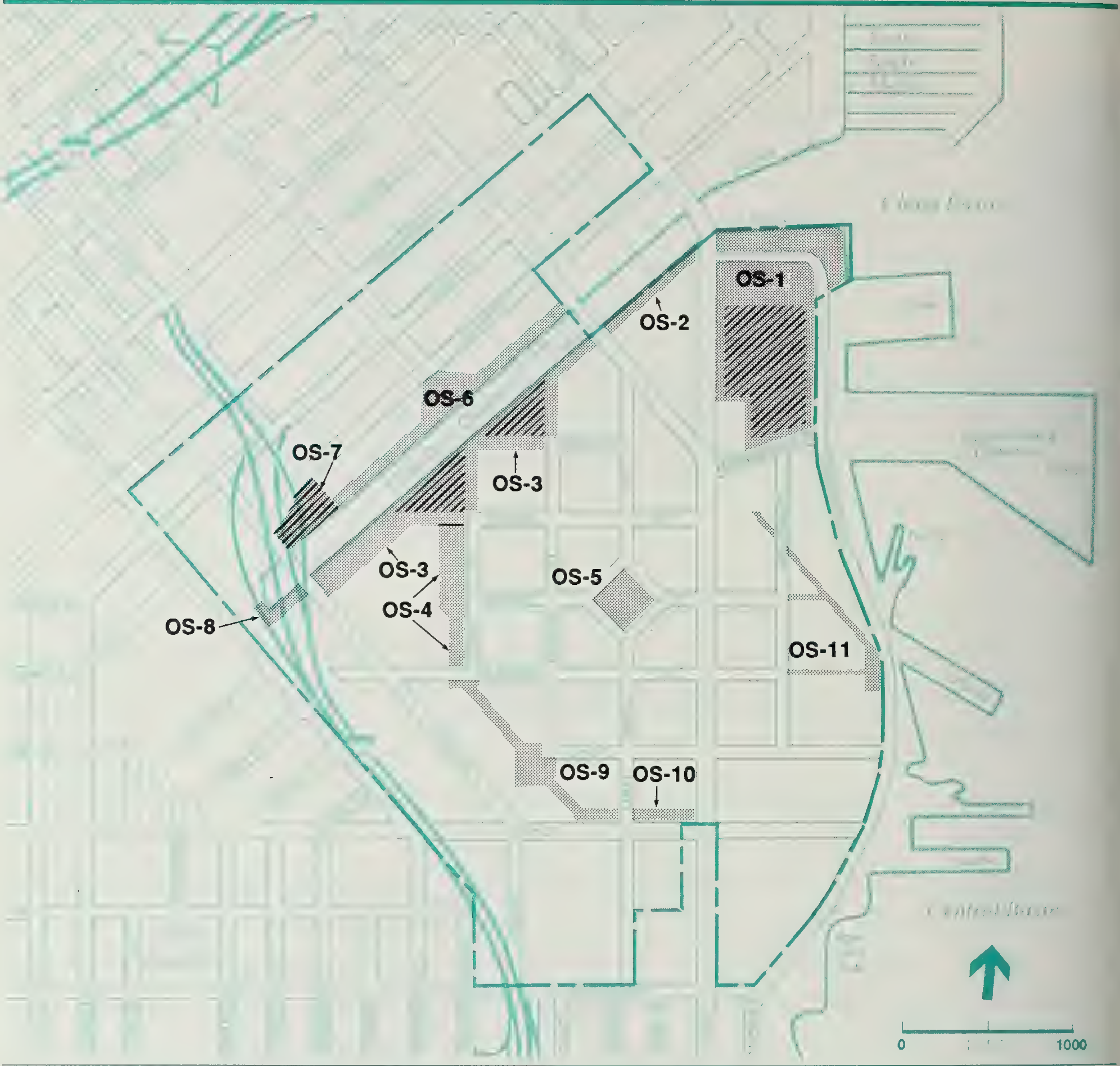
Alternative N

The 0.8-acre community facilities site identified in Alternative N (see Figure V.3, p. V.18) would not be large enough to accommodate a SFUSD school. As the Project Area student population would not warrant a new school, that site would more likely be allocated to other community services.

RECREATION AND PARKS

For each Alternative in the year 2000 and then for the year 2020, this section describes open space provided in the Project Area, estimates personnel required to maintain that open space, estimates the open space demand of residents and employees, and evaluates how open space proposed in Mission Bay would serve Nearby Areas. The section concludes with an assessment of how the Alternatives in both 2000 and 2020 respond to relevant recreation and open space policies.

Maps that show the open space network in each Alternative that would be developed at build-out/2020 are presented in Figures VI.D.6-VI.D.8, pp. VI.D.62-VI.D.64. The open space areas depicted on those maps are conceptual, that is, boundaries and acreages are approximate; exact sizes and configurations may differ somewhat from the maps. The maps provide a reference system (OS-1, OS-2, etc.) that is used throughout the EIR. In addition to Project Area open space, several existing recreation and open space opportunities are available within about 1,500 feet of the Project Area (see Figure VI.D.3, p. VI.D.12). The maps do not indicate publicly accessible open space associated with housing, office and S/LI/RD uses.



- - - MISSION BAY BOUNDARY

▨ ACTIVE SPORTS AREA (non-hatched open space areas are passive open space)

OPEN SPACE PROVIDED BY 2000

OS-1	16.5 ACRES
OS-2	1.6 ACRES
OS-3	10.8 ACRES
OS-4	2.5 ACRES
OS-5	2.0 ACRES

OPEN SPACE PROVIDED AFTER 2000 AND BY 2020

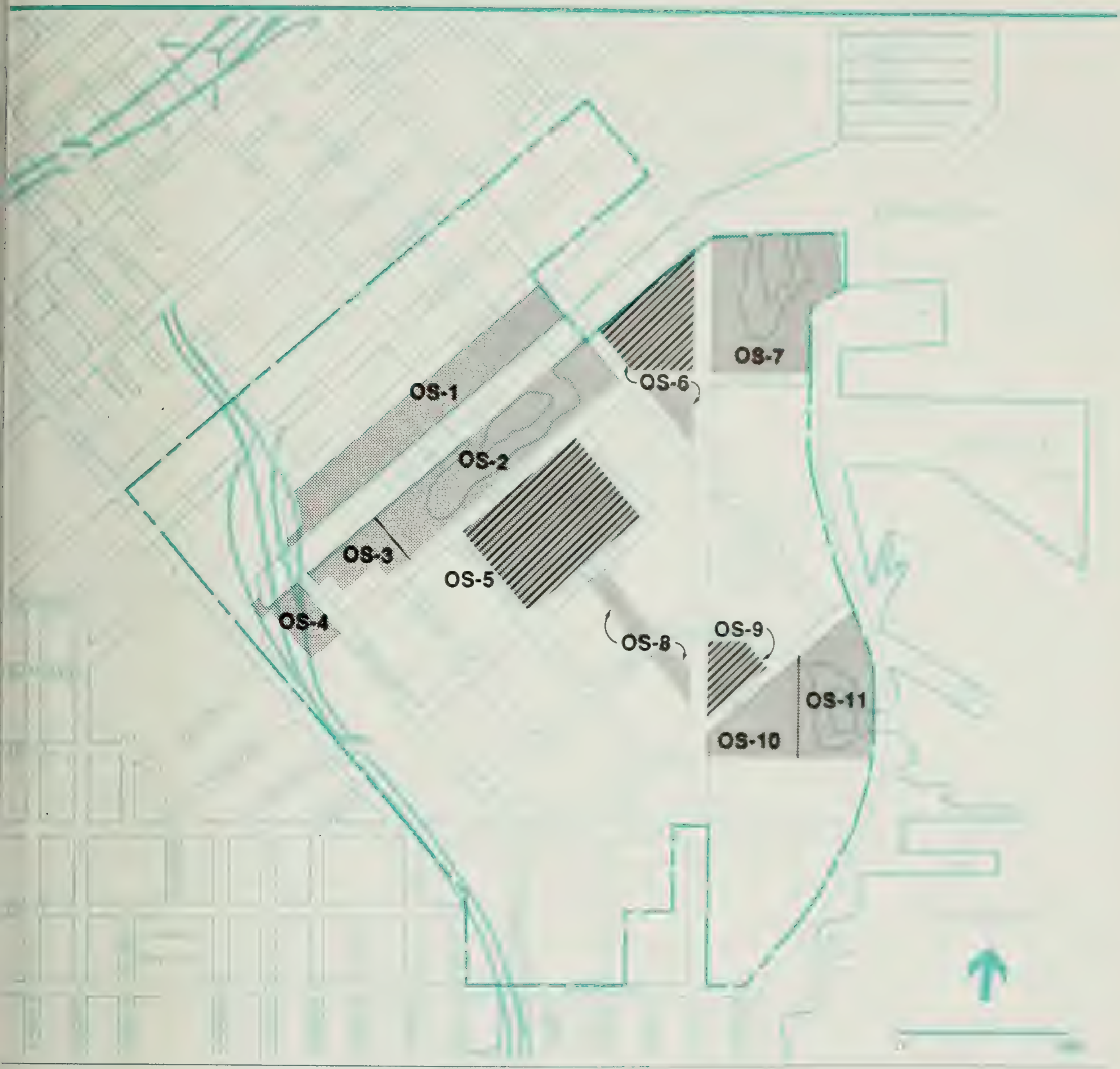
OS-6	3.0 ACRES
OS-7	1.0 ACRE
OS-8	0.5 ACRE
OS-9	3.4 ACRES
OS-10	0.4 ACRE
OS-11	1.6 ACRES

NOTE: This figure does not show additional open space that would be included with housing, office and S/LI/RD uses.

Mission Bay

FIGURE VI.D.6
ALTERNATIVE A OPEN SPACE

SOURCE: Environmental Science Associates, Inc.



— — — MISSION BAY BOUNDARY

▨ ACTIVE SPORTS AREA
(non-hatched open space areas are passive open space)

OPEN SPACE PROVIDED BY 2000

OS-1	11.0 ACRES
OS-2	13.2 ACRES
OS-3	3.2 ACRES
OS-4	2.1 ACRES

OPEN SPACE PROVIDED AFTER 2000 AND BY 2020

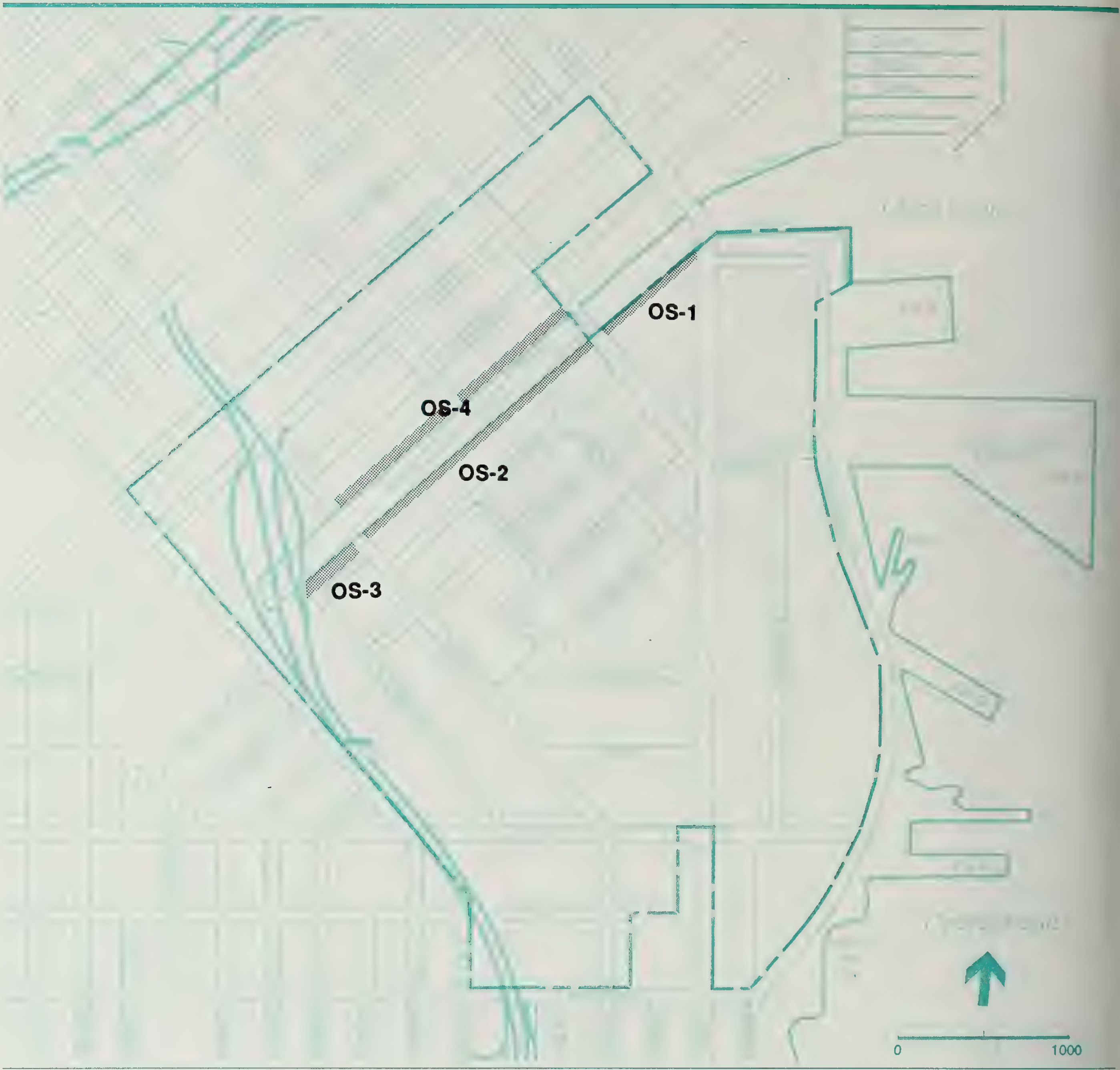
OS-5	13.2 ACRES
OS-6	7.3 ACRES
OS-7	13.6 ACRES
OS-8	2.4 ACRES
OS-9	2.8 ACRES
OS-10	6.3 ACRES
OS-11	7.0 ACRES

NOTE: This figure does not show additional open space that would be included with housing, office and S/LI/RD uses

Mission Bay

FIGURE VI.D.7
ALTERNATIVE B OPEN SPACE

SOURCE: Environmental Science Associates, Inc.



MISSION BAY BOUNDARY

OPEN SPACE PROVIDED BY 2000	
OS-1	0.8 ACRE
OS-2	2.0 ACRES
OS-3	0.6 ACRE

OPEN SPACE PROVIDED AFTER 2000 AND BY 2020	
OS-4	1.8 ACRES

Mission Bay

FIGURE VI.D.8
ALTERNATIVE N OPEN SPACE

SOURCE: Environmental Science Associates, Inc.

Public Plans and Policies

As discussed in the Setting section, several planning documents set forth policies that guide recreation, open space and parkland uses in the Mission Bay Project Area and Nearby Areas (see Setting, p. VI.D.15). Following the section on the year 2020, Table VI.D.19, pp. VI.D.87-VI.D.91, compares the Alternatives to those policies and covers the years 2000 and 2020.

2000

Project Area Open Space

Table VI.D.11 shows the open space acreage included in the Mission Bay Project Area for each Alternative in the year 2000. Total open space is categorized by parkland (active and passive), the 12-acre China Basin Channel, wetlands, and publicly accessible open space associated with housing, office and S/LI/RD uses.

Table VI.D.12, p. VI.D.67, summarizes the active sports areas, passive recreation areas and walking and biking paths that would be provided under each Alternative by the year 2000. The land areas generally required to accommodate sports activities, play areas and recreation buildings are presented in Appendix D. Table XIV.D.29, p. XIV.D.32.

Table VI.D.12 also lists the 12-acre China Basin Channel which is included in the open space totals for each Alternative. The channel would provide recreational boating opportunities and be a visual amenity. The table also shows that wetlands would be provided under Alternative B, with public access on boardwalks or paths along the periphery. Open space associated with other uses would include publicly accessible open space provided as part of housing, office and S/LI/RD uses. Such open space would be in addition to the major public open spaces, and could include courtyards, tot lots, and plazas. Private open space such as balconies or patios also would be included with housing. Open space associated with other uses is not included in Table VI.D.12.

Personnel Requirements

Personnel would be needed to maintain new Project Area open space and to direct recreation programs. It has not been determined what agency or private entity would maintain Mission Bay open spaces, parks and recreation facilities/123/; those personnel

TABLE VI.D.11: PROJECT AREA OPEN SPACE BY ALTERNATIVE, 1985 AND 2000 (Acres)

		2000		
Open Space	1985	Alternative A	Alternative B	Alternative N
Parkland/a/	0	33.4	16.3	3.4
Active	0	12.0	0	0
Passive	0	21.4	16.3	3.4
China Basin Channel	12.0	12.0	12.0	12.0
Wetlands/b/	0	0	13.2	0
Subtotal	12.0	45.4	41.5	15.4
Associated with Other Uses/c/	0	5.7	2.4	0
Housing	0	1.4	1.3	0
Office	0	1.8	1.1	0
S/LI/RD	0	2.5	0	0
TOTAL	12.0	51.1	43.9	15.4

/a/ Parkland is divided into active and passive uses. Table VI.D.12 summarizes and defines active sports areas, passive recreation areas and paved walking / biking paths (included in total parkland devoted to passive uses).

/b/ Wetlands would be tidal with contoured, natural edges, include berms with trees, and provide nesting islands.

/c/ This publicly accessible open space would be provided as part of the specific development plans for the referenced uses. The acreage is part of the acreage designation for each specific use.

SOURCE: Environmental Science Associates, Inc.

could be employees of the San Francisco Recreation and Park Department, another public agency such as the Port of San Francisco, the project sponsor or future property owners. Table VI.D.13, p. VI.D.69, presents estimates of gardening/landscape maintenance workers, custodians and recreation directors associated with open space for each Alternative in the year 2000./124/ In addition to those requirements, ranging from three to 25 positions, other staff for periodic support services such as major cleaning, pruning, and repairing equipment and facilities would probably be required if the San Francisco Recreation and Park Department, or a similarly structured organization, were to maintain the parkland.

TABLE VI.D.12: PROJECT AREA RECREATION AND OPEN SPACE FEATURES OF ALTERNATIVES, 2000

Features	Alternative A	Alternative B	Alternative N
Active Sports Areas/a/	Active sports on approximately one-half the area bounded by Third and Mission Rock Streets and the channel (OS-1); and portions of the area along the south side of the channel (OS-3).	No active sports areas developed by year 2000.	No active sports areas.
Passive Recreation Areas/b/	Passive recreation on the remainder of OS-1, the central square (OS-5); and most of the area south of the channel (OS-2 and OS-3).	Passive recreation on north side of channel (OS-1) and on south side of channel (OS-3 and OS-4).	Narrow passive recreation areas along south side of channel (OS-1, OS-2 and OS-3).
Paved Walking/ Biking Paths	Open space strips from houseboat area to Alameda Street for walking and biking (OS-4).	None developed by year 2000.	None.
Wetlands	No wetlands.	Mid-channel tidal wetland, on south side of channel, west of Fourth Street (OS-2), with contoured, natural edges, berms with trees, and nesting islands.	No wetlands.
China Basin Channel/c/	Minimal change in channel configuration. Edges in Division Street outfall area would be natural, contoured, with gabions; edges on north side would be T-wall, decking and gabions; edges on south side would be decking and gabions./d/	Channel to be re-configured for mid-channel wetland. Edges in Division Street outfall area would be natural, contoured, with gabions; edges on north and south sides would be decking with gabions./d/	No change in channel configuration: natural contoured edges. Public access strip all around channel; through vacant parcels around Pump Station.

(continued)

TABLE VI.D.12: PROJECT AREA RECREATION AND OPEN SPACE FEATURES OF ALTERNATIVES, 2000 (continued)

/a/ Active sports areas could accommodate playing fields and courts for soccer, softball, football, baseball, and tennis, as well as recreation buildings with multipurpose rooms, assembly rooms and gyms.
/b/ Passive recreational areas could include lawns, wooded and landscaped areas, picnic areas, benches, gardens, tot lots and play equipment areas and paths; there may be fountains or other small water features. Walking, sitting, kite-flying or tossing frisbees would be representative activities in open areas. Tot lots and play areas would include equipment such as slides, swings, climbers, play sculptures and sand areas.
/c/ The channel would remain tidal, with no change in natural circulation.
/d/ Edge treatments (T-wall, gabions, and decking) are briefly defined in footnote/b/ in Table V.3, p. V.20.

SOURCE: Environmental Science Associates, Inc.

Project Area Open Space Demand

Project Area residents and employees would have diverse and complex open space and recreation needs. Although quality of open space is often more important than quantity, a new development should provide enough open space acreage to support the demand of residents and employees. Table VI.D.14, p. VI.D.71, uses National Recreation and Park Association (NRPA) standards for neighborhood- and district-serving open space to illustrate the relative open space need of the Alternatives in the year 2000./125/ The NRPA standards are ratios of acreages of different types of parkland per 1,000 population. The standards also relate parkland types to ranges of population served and service areas. Under those standards, the Mission Bay Alternatives would create demand for 1) neighborhood parks to serve a neighborhood of 2,000 to 10,000 within a quarter- to half-mile radius at a ratio of 2.5 acres per 1,000 residents; and 2) district parks serving a population of 10,000 to 50,000 within a one-half to three-mile radius, at a ratio of 2.5 acres per 1,000 people. Thus, Mission Bay neighborhood and district park demand would be five acres per 1,000 population. The NRPA standards also call for provision of a large urban park of 100 acres or more to serve a population of 50,000 within a half-hour driving time, at a ratio of five acres per 1,000 population. These three NRPA

TABLE VI.D.13: ESTIMATED PROJECT AREA OPEN SPACE AND RECREATION PERSONNEL REQUIREMENTS, BY ALTERNATIVE, 1985 AND 2000/a/

	1985	2000		
		Alternative A	Alternative B	Alternative N
Gardening and Landscape Maintenance/b/	0	15.5	8.0 /c/	1.5
Custodian/d/	0	2.5	2.0	0
Recreation Director/e/	0	7.0	0	0
TOTAL		25.0	10.0	1.5

/a/ Estimates include personnel required to maintain passive and active parkland seven days per week. Estimates do not include personnel required to maintain open space associated with other uses. It is assumed that maintenance of open space associated with other uses would be the responsibility of the housing, office and S/LI/RD management.

/b/ Parkland gardening and landscape maintenance personnel are based on a staffing level for comparable facilities of one gardener/landscape worker per 2.14 acres of passive and active parkland.

/c/ Gardening and landscape maintenance personnel estimates for Alternative B include one half-time gardener/landscape worker to pick up trash and empty trash cans about two to three days each week at the wetlands (OS-2). Other personnel that could be needed to maintain the wetlands are not included in this table. For example, additional workers could be needed to monitor the wetlands' ecology, staff educational programs, provide maintenance dredging, and perform major cleaning or restoration work.

/d/ Custodians estimated on the basis of number and type of buildings, rest rooms and paved paths and courts that could be accommodated within active open space areas and estimated intensity of use of passive open space areas requiring trash collection. Custodial services in Alternative N would be provided by mobile crews.

/e/ Recreation director requirements estimated on the basis of recreation programs that could be provided within active open space areas and staffing levels for comparable facilities.

SOURCE: San Francisco Recreation and Park Department, Neighborhood Parks Division and Environmental Science Associates, Inc.

---

criteria result in a total ratio of 10 acres per 1,000 population. In some cases, the needs would not be strictly additive, as in the case of a residential area adjacent to a large urban park that provided neighborhood-level open space for those residents. The NRPA ratios are also cited in the Recreation and Open Space Element. Existing San Francisco open space, including Recreation and Park Department and state and federal parklands, provide a ratio of 5.5 acres per 1,000 population, compared to the 10-acre standard./126/ If the Presidio of San Francisco, which is an open space amenity though not permanently dedicated to that use, were included, the citywide open space ratio would be 6.6 acres per 1,000 population. The Element notes that given the existing development patterns, high population density, and relatively small area in San Francisco, it will not be possible to achieve the NRPA standard in City limits, but, to the extent it reasonably can, the per capita supply of open space should be increased.

The demand estimates in Table VI.D.14 are compared to parkland area (not including China Basin Channel or open space associated with residential, office and S/LI/RD uses) included in each Alternative. As shown in the table, parkland provided in the Project Area in the year 2000 would meet the benchmarks for neighborhood- and district-level resident and employee open space needs for each Alternative. The analysis assumes that large urban park needs would be met outside the Project Area. In practice, Mission Bay residents would also use district open space outside the Project Area, and Project Area open space would serve needs of Nearby Areas, as discussed below. (The table indicates that the need for open space could be met in terms of quantity of open space, but not necessarily in terms of quality or type.)

Open Space Needs in Nearby Areas

Figure VI.D.3, p. VI.D.12, shows the locations of existing park, open space and recreation opportunities in the Project Area and within about 1,500 feet of the Project Area. The Recreation and Open Space Element of the Master Plan classifies the neighborhood service area radius for a neighborhood park to be approximately one-quarter mile, a walking distance of about five minutes./127/ Based on the service area concept and other geographical features, the Element identifies the Project Area, parts of the South of Market, Inner Mission and Showplace Square, and the Lower Potrero Hill and Central Bayfront Nearby Areas as "areas not served by public open space."/127/ The South of Market Plan: Proposal for Citizen Review identifies planned parks and park opportunity sites in the South of Market Nearby Area./128/ Even if new parks were developed in the South of Market by the year 2000, its residents and workers could benefit from new open space in Mission Bay.

Although new open space and recreation opportunities developed in the Project Area in the Alternatives by the year 2000 would help serve high need areas in South of Market and Showplace Square, none of those opportunities would be located within the neighborhood

TABLE VI.D.14: COMPARISON OF ESTIMATED PROJECT AREA OPEN SPACE DEMAND TO OPEN SPACE, BY ALTERNATIVE, 2000 (Acres)/a/

	2000		
	Alternative A	Alternative B	Alternative N
Open Space Demand			
Resident/b/	27.2	25.2	0.2
Employee/c/	1.4	0.7	1.0
Parkland Provided in Project Area/d/	33.4	29.5	3.4

/a/ Open space demand is based on population and employment estimates presented in Table V.3, p. V.20, and Table V.5, p. V.34. Estimates of residential demand and employee demand are not additive; the parkland that would serve residents also would serve employees and vice versa.

/b/ Estimates of resident demand for open space are based on a national standard of 2.5 acres of neighborhood-serving open space and 2.5 acres of district-serving open space per 1,000 residents (Robert D. Buechner [Ed.]. Park, Recreation and Open Space Standards, National Recreation and Park Association, 1971, as cited in Seymour M. Gold, Recreation Planning and Design, McGraw-Hill, Inc., 1980.) Use of a standard to estimate open space demand has several shortcomings. Standards address quantity, but not type and quality of open space or how well it is designed, meets community needs, or reflects current leisure needs and preferences. Standards do not account for socioeconomic changes in a community over time and may or may not be realistic in light of a community's ability to implement them.

/c/ Estimates of employee demand for open space are based on the Downtown Plan's requirement that commercial developments provide one square foot of open space for every 50 gross square feet of building space. (San Francisco Department of City Planning, Downtown Plan, adopted by the City Planning Commission, Resolution No. 10163, November 29, 1984.) Using an employment density factor of one employee per 290 gross square feet, that requirement was converted to a standard of 0.14 acre of open space per 1,000 employees.

/d/ This analysis compares estimated user demand to parkland and wetlands open space only, which does not include other types of open space in the Alternatives (China Basin Channel and open space associated with residential, office and S/LI/RD uses). See Table VI.D.11, p. VI.D.66.

SOURCE: Environmental Science Associates, Inc.

service areas of the Lower Potrero Hill and Central Bayfront Nearby Areas. While open space provided in the Project Area under all Alternatives would serve North Potrero Hill and Potrero Hill Nearby Areas, the Recreation and Open Space Element does not identify those areas as "areas not served by public open spaces."

Alternative A

As summarized in Table VI.D.11, p. VI.D.66, in the year 2000 open space would total 51.1 acres (39.1 acres of land and 12 acres of water) under Alternative A. Figure VI.D.6, p. VI.D.62, shows active and passive open space areas developed at build-out/2020. Five of those areas would be developed by the year 2000:

- OS-1: A 16.5-acre park would include an area on the southern shore of China Basin east of Third Street, and north of China Basin Street that would be used primarily for passive recreation areas such as picnic and lawn areas. A 13.6-acre park would be bounded by Third, Mission Rock and China Basin Streets. About eight acres here would be used for active sports. While not specifically assumed in the analysis, the park could accommodate a recreation building within the eight-acre area. The remaining area would be available for passive uses.

- OS-2: A 1.6-acre strip developed in the initial phase along the southern shore of the channel between Third and Fourth Streets would offer passive recreational opportunities, and would continue public access around the channel.

- OS-3: A 10.8-acre area would be provided along the south shore of the channel between Owens and Fourth Streets. About four acres in this area would be used for active sports activities and/or recreation of the types listed in Appendix D. Table XIV.D.27, p. XIV.D.31. Remaining areas would be passive recreational areas such as strolling and viewing areas along the shore of the channel. (In the initial phase, four acres of this area would be developed; two acres for passive recreation and two acres for active.)

- OS-4: A 2.5-acre area would provide a walking and biking path from the houseboat area to Alameda Street.

- OS-5: A two-acre central square on Division Street would provide a neighborhood park for passive recreation to serve the surrounding residential and retail district.

As presented in Table VI.D.13, p. VI.D.69, parkland under this Alternative would require about 15.5 full-time staff for gardening and landscape maintenance and about 2.5 custodians. Recreation programs at active sports areas and recreation buildings would require about seven recreation directors.

In 2000, about 3,100 employees would work in the approximately 1.3 million square feet of S/LI/RD space located east of Third Street between 15th and Mariposa Streets. Those employees would be about 1,300 feet (a walking distance of about five minutes) from OS-5, the closest parkland. S/LI/RD employees also would have about 2.5 acres of open space associated with S/LI/RD space.

All other new Project Area residential and non-residential uses would be about 700 feet from Project Area parkland (a walking distance of about three minutes). Project Area residents would live within walking distance of China Basin Park (OS-1), parkland on the south side of the channel (OS-2, OS-3, and OS-4) and the central square (OS-5). Those areas would offer a range of passive and active recreation opportunities for residents of all ages. Though not specifically assumed, the active parkland could accommodate a recreation building such as a gym or multi-purpose room. Residents also would be served by a total of about 1.4 acres of publicly accessible open space provided as part of the new residential developments.

Office and retail workers in the blocks bounded by Townsend, Third, Berry and Fourth Streets could walk down Third or Fourth Streets to open space provided at China Basin Park (OS-1) and along the south side of the channel (OS-2, OS-3 and OS-4). Office and retail employees at that location also would use a total of about 1.8 acres of publicly accessible open space provided as part of developments in the office blocks.

The hotel on Third Street would overlook China Basin Park (OS-1) and provide employees and guests with access to that park and to parkland along the southern shore of the channel (OS-2 and OS-3). Retail employees and customers along the central north-south street would use the central square (OS-5).

Mission Bay open space, including open space south of the channel (OS-2, OS-3 and OS-4) could serve the South of Market and Showplace Square Nearby Areas. Open space along the China Basin Channel area (OS-2 and OS-3) would help link Showplace Square to China Basin Park (OS-1). The South of Market Nearby Area could access China Basin Park (OS-1) via Third Street or from Fourth Street through the 1.6-acre strip along the southern shore of the channel (OS-2).

Initial Phase of Development. Project Area residents would need about five acres of parkland, while 5.6 acres would be provided. (The initial phase of development would include two acres of active parkland, 3.6 acres of passive parkland, as well as the 12-acre channel and 0.9 acre of open space associated with other uses.)

Alternative B

As summarized in Table VI.D.11, p. VI.D.66, in the year 2000, open space would total about 43.9 acres. Figure VI.D.7, p. VI.D.63, shows the open space areas that would be developed at build-out/2020. Four of those areas would be developed by the year 2000:

- OS-1: A 10.7-acre shoreline park would be provided in the area bounded by the northern shore of the China Basin Channel, the freeway, Berry Street and Fourth Street. This park could accommodate a full range of passive recreational opportunities including picnic, lawn, beach and garden areas, and a tot lot and a playground. A 0.3-acre strip adjacent to this area would abut the northern shore of the channel and provide a continuation of pedestrian access under the freeway, around the channel.
- OS-2: A 13.2-acre wetland would be provided along the southern shore of the channel. Wetlands are further discussed in VI.K. Geology and Seismicity, p. VI.K.23; VI.L. Hydrology and Water Quality, pp. VI.L.29-VI.L.30; and VI.M. Vegetation and Wildlife, p. VI.M.12.
- OS-3: A 3.2-acre area developed in the initial phase adjacent to the wetlands and further bounded by Hooper and Owens Streets and the southern shore of the channel would continue access around the channel and could accommodate additional passive recreation activities.
- OS-4: A 2.1-acre park included in the initial phase between the CalTrain Station and Owens Street would provide passive open space.

As presented in Table VI.D.13, p. VI.D.69, open space under Alternative B would require about eight gardening and landscape maintenance workers, and about two custodian positions. No recreation directors would be needed because Alternative B would not provide active recreation opportunities by the year 2000.

Most new Project Area land uses would be located within about 700 feet of Project Area parkland. The exception would be 270 units of MDR located on Owens Street between Hooper and Hubbell Streets, which would be about 1,300 feet from Project Area parkland. Project Area residents would live within walking distance of open space on the north side of the channel (OS-1), the south side of the channel (OS-3 and OS-4), and wetlands habitat at the mid-channel wetlands (OS-2). Those areas would offer various passive recreation opportunities for residents of all ages. Their recreation needs would not be fully served because Alternative B would not provide active recreation areas, suitable for field and court sports and recreation buildings, by the year 2000. That lack of active recreation areas reflects this Alternative's trade-off between wetlands acreage and active open space acreage that may be more appropriate to serve resident and employee populations. Table VI.D.14, p. VI.D.71 does show, however, that open space needs are still met by Alternative B.

Residents also would be served by about 1.3 acres of publicly accessible open space provided within the individual housing developments. In addition to the open space provided within the Owens Street office block, office employees would work near the OS-4. Through that area, office employees would have access to the greater Project Area open space network.

New open space provided in Mission Bay, including OS-1, OS-2, OS-3 and OS-4, would help serve the South of Market and Showplace Square Nearby Areas. OS-4 would help link Showplace Square to the Project Area open space network. Residents and employees of the South of Market Nearby Area would be near the open space on the north side of the channel (OS-1) and could use other Project Area open space.

Initial Phase of Development. Project Area residents would need about four acres of parkland, while 5.3 acres would be provided. (The initial phase would include 5.3 acres of passive parkland, as well as the 12-acre channel and 0.7 acre of open space associated with other uses.)

Alternative N

As summarized in Table VI.D.11, p. VI.D.66, in the year 2000, open space would total 15.4 acres, including 3.4 acres of passive parkland and the 12-acre channel. No wetlands, parkland for active sports, or open space associated with other uses would be provided. Figure VI.D.8, p. VI.D.64, shows the open space areas that would be developed at build-out (2020). Three contiguous open space strips totaling 3.4 acres (OS-1, OS-2 and OS-3) would provide public access along the southern shore of the channel, from Owens Street to Third Street, and would accommodate passive shoreline recreation activities such as picnicking, viewing and walking. As shown in Table VI.D.13, p. VI.D.69, parkland under Alternative N would require about 1.5 gardeners and custodial services would be provided by mobile crews.

In the year 2000, houseboat residents would need about 0.1 acre of open space and employees would need about one acre, while about 3.4 acres would be provided (see

Table VI.D.14, p. VI.D.71). All new Project Area land uses would be located within about 1,300 feet from Project Area parkland. Employees who would work at the office block bounded by Townsend, Third, King and Fourth Streets would approach the open space along the south side of the channel (OS-1, OS-2 and OS-3) via Third and Fourth Streets. Employees in new M-2 Industrial space west of Third Street also would be close to shoreline open space.

New open space provided under Alternative N would help serve the South of Market and Showplace Square Nearby Areas, but to a lesser degree than with Alternatives A and B because it would provide much less open space.

Build-Out/2020

Project Area Open Space

Table VI.D.15 shows the total open space acreage included in the Project Area under each Alternative in the year 2020 and the amounts of open space added under each Alternative between 2000 and 2020. Figures VI.D.6-VI.D.8, pp. VI.D.62-VI.D.64, show the open space network in each Alternative, each of which would represent a net addition to existing open space and recreation opportunities within about 1,500 feet of the Project Area (see Figure VI.D.3, p. VI.D.12). The active sports areas, passive recreation areas and paved walking and biking paths that would be provided by the year 2020 under each Alternative in addition to those provided by the year 2000 are summarized in Table VI.D.16, p. VI.D.78. The amount of land areas generally required to accommodate sports activities, play areas and recreation buildings is presented in Appendix D. Table XIV.D.29, p. XIV.D.32).

Personnel Requirements

Table VI.D.17, p. VI.D.80 presents total estimates of the gardening and landscape maintenance workers, custodians and recreation directors required to serve the total open space under each Alternative in the year 2020. Those requirements would range from about 4.5 to 40.5 positions./124/ Besides total employees at build-out/2020, Table VI.D.17 also shows the increments of employees that would be needed by 2020 over those that would be needed by 2000. In addition to those requirements, other staff for periodic support services such as major cleaning, pruning and repairs would probably be required if the Recreation and Park Department, or a similarly structured organization, were to maintain the parkland.

TABLE VI.D.15: PROJECT AREA OPEN SPACE BY ALTERNATIVE, 1985, 2000 AND BUILD-OUT/2020 (Acres)

		Alternative A			Alternative B			Alternative N		
Open Space	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2000
Parkland/a/	0	33.4	43.3	+9.9	16.3	48.3	+32.3	3.4	5.2	+1.8
Active	0	12.0	13.0	+1.0	0	22.1	+22.1	0	0	+0
Passive	0	21.4	30.3	+8.9	16.3	26.2	+10.2	3.4	5.2	+1.8
China Basin Channel	12.0	12.0	12.0	+0	12.0	12.0	+0	12.0	12.0	+0
Wetlands/b/	0	0	0	+0	13.2	33.8	+20.6	0	0	0
Subtotal	12.0	45.4	55.3	+9.9	41.5	94.1	+52.9	15.4	17.2	+1.8
Associated with Other Uses/c/	0	5.7	16.0	+10.3	2.4	8.3	+5.9	0	0	+0
Housing	0	1.4	4.4	+3.0	1.3	6.4	+5.1	0	0	+0
Office	0	1.8	5.1	+3.3	1.1	1.1	+0	0	0	+0
S/LI/RD	0	2.5	6.5	+40	0	0.8	+0.8	0	0	+0
TOTAL	12.0	51.1	71.3	+20.2	43.9	102.4	+58.8	5.4	17.2	+1.8

/a/ Parkland is divided into active and passive uses. Table VI.D.16 summarizes active sports areas, passive recreation areas and paved walking/biking paths (included in total parkland devoted to passive uses).

/b/ Wetlands would be tidal with soft, natural edges, include berms with trees, and provide nesting islands; boardwalks or paths around the perimeter would be provided for public access.

/c/ This publicly accessible open space would be provided as part of the specific development plans for the referenced uses. The acreage is part of the acreage designation for each specific use.

SOURCE: Environmental Science Associates, Inc.

TABLE VI.D.16: ADDITIONAL PROJECT AREA RECREATION AND OPEN SPACE FEATURES PROVIDED AFTER 2000, BY ALTERNATIVE, BUILD-OUT/2020/a/

Features	Alternative A	Alternative B	Alternative N
Active Sports Areas/b/	Active sports on the area south of Berry St. near the west end of the channel (OS-7).	Active sports on the area near Third and Yuma Streets (OS-9); north of the intersection of Third and Hooper Streets (OS-6); and the rectangular area between Hooper and Hubbell (OS-5).	No active sports areas.
Passive Recreation Areas/c/	Passive recreation at the area north of the channel (OS-6); and the area at the south-west end of the channel (OS-8).	Passive recreation on remainder of OS-6; and the area south of Yuma Street (OS-10).	Narrow passive recreation area along north side of channel (OS-4).
Paved Walking/ Biking Paths	Open space strips from closed Fire Station No. 30 to Alameda Street (OS-11); and from Alameda Street to 16th Street for walking and biking (OS-9 and OS-10).	Open space strip from Third Street near Yuma northwest to Hubbell Street (OS-8).	None.
Wetlands	No wetlands.	Tidal wetlands at China Basin (OS-7) and between Piers 54 and 64 (OS-11); contoured, natural edges; berms with trees; nesting islands.	No wetlands.

(continued)

TABLE VI.D.16: ADDITIONAL PROJECT AREA RECREATION AND OPEN SPACE FEATURES PROVIDED AFTER 2000, BY ALTERNATIVE, BUILD-OUT/2020/a/ (continued)

/a/ Project Area recreation and open space features provided by the year 2000 are presented in Table VI.D.12, p. VI.D.67.

/b/ Active sports areas could accommodate playing fields and courts for football, baseball, soccer, softball and tennis, as well as recreation buildings with multipurpose rooms, assembly rooms and gyms.

/c/ Passive recreational areas could include lawns, wooded and landscaped areas, picnic areas, benches, gardens, tot lots and play equipment areas and paths; there may be fountains or other small water features. Walking, sitting, kite-flying or tossing frisbees would be representative activities in open areas. Tot lots and play areas would include equipment such as slides, swings, climbers, play sculptures and sand areas.

SOURCE: Environmental Science Associates, Inc.

Project Area Open Space Demand

Table VI.D.18, p. VI.D.81, presents estimates of total demand by Project Area residents and employees for neighborhood and district serving open space under each Alternative in the year 2020 and compares demand to the total acres of parkland provided in each Alternative. As shown in the table, Alternatives A and B would not provide sufficient parkland to meet the NRPA criteria. Alternative A would provide about three acres per 1,000 population of neighborhood and district open space, and Alternative B, 4.4 acres per 1,000. Those ratios can be compared to a ratio of 3.2 acres per 1,000 population in the Marina-Cow Hollow-Pacific Heights area, and 2.1 acres per 1,000 population in Potrero Hill. Alternative N would provide sufficient parkland for the Mission Bay houseboat resident and employee population.

Open Space Needs in Nearby Areas

As stated in the discussion for the year 2000 (see p. VI.D.70), the Recreation and Open Space Element identifies parts of South of Market, Inner Mission and Showplace Square, and Lower Potrero Hill and Central Bayfront as "areas not served by public open space" or

TABLE VI.D.17: ESTIMATED PROJECT AREA OPEN SPACE AND RECREATION PERSONNEL REQUIREMENTS, BY ALTERNATIVE, 1985, 2000 AND BUILD-OUT/2020/a/

		Alternative A			Alternative B			Alternative N		
	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2000
Gardening and Landscape Maintenance/b/	0	15.5	20.0	+4.5	8.0/c/	24.0/c/	+16.0	1.5	2.5	+1.0
Custodian/d/	0	2.5	5.5	+3.0	2.0	6.0	+4.0	0	0	+0
Recreation Director/e/	0	7.0	8.5	+1.5	0	10.5	+10.5	0	0	+0
TOTAL		25.0	34.0	+9.0	10.0	40.5	+30.5	1.5	2.5	+1.0

/a/ Estimates include personnel required to maintain passive and active parkland seven days per week. Estimates do not include personnel required to maintain open space associated with other uses. It is assumed that maintenance of open space associated with other uses would be the responsibility of the housing, office and S/LI/RD management.

/b/ Parkland gardening and landscape maintenance personnel are based on a staffing level for comparable facilities of one gardener/landscape worker per 2.14 acres of passive and active parkland.

/c/ Gardening and landscape maintenance personnel estimates for Alternative B include clean-up crews about two to three days each week at the wetlands. By the year 2000, about one-half gardener/landscape maintenance position would be needed to perform that task for the mid-channel wetlands (OS-2). One additional such position would be needed by build-out for the additional wetlands (OS-7 and OS-11). Other personnel that could be needed to maintain the wetlands are not included in this table. For example, additional workers could be needed to monitor wetlands ecology, staff educational programs, provide maintenance dredging, and perform major cleaning or restoration work.

/d/ Custodians estimated on the basis of number and type of buildings, rest rooms, and paved paths and courts that could be accommodated within active open space areas and estimated intensity of use of passive open space areas requiring trash collection. Custodial services in Alternative N would be provided by mobile crews.

/e/ Recreation director requirements estimated on the basis of recreation programs that could be provided within active open space areas and staffing levels for comparable facilities. Recreation director estimates for Alternatives A and B in the year 2020 include one area recreation supervisor/coordinator.

SOURCE: San Francisco Recreation and Park Department, Neighborhood Parks Division, and Environmental Science Associates, Inc.

TABLE VI.D.18: COMPARISON OF ESTIMATED PROJECT AREA OPEN SPACE DEMAND TO OPEN SPACE, BY ALTERNATIVE, BUILD-OUT/2020 (Acres)/a/

	2020		
	Alternative A	Alternative B	Alternative N
Open Space Demand			
Resident/b/	72.0	93.4	0.2
Employee/c/	3.5	0.9	2.4
Parkland Provided in Project Area/d/	43.3	82.1	5.2

/a/ Open space demand is based on population and employment estimates presented in Table V.6, p. V.36 and Table V.7, p. V.39. Estimates of residential demand and employee demand are not additive; the parkland that would serve residents also would serve employees and vice versa.

/b/ Estimates or residents' demand for open space are based on a national standard of 2.5 acres of neighborhood-serving and 2.5 acres of district-serving open space per 1,000 residents (Robert D. Buechner (Ed.). Park, Recreation and Open Space Standards, National Recreation and Park Association, 1971, as cited in Seymour M. Gold, Recreation Planning and Design, McGraw-Hill, Inc., 1980.) Use of a standard to estimate open space demand has several shortcomings. Standards address quantity, but not type and quality of open space or how well it is designed, meets community needs, or reflects current leisure needs and preferences. Standards do not account for socioeconomic changes in a community over time and may or may not be realistic in light of a community's ability to implement them.

/c/ Estimates of employee demand for open space are based on the Downtown Plan's requirement that commercial developments provide one square foot of open space for every 50 gross square feet of building space. (San Francisco Department of City Planning, Downtown Plan, adopted by the City Planning Commission, Resolution No. 10163, November 29, 1984.) Using an employment density factor of one employee per 290 gross square feet, that requirement was converted to a standard of 0.14 acre of open space per 1,000 employees.

/d/ This analysis compares estimated user demand to parkland and wetlands open space only, which does not include other types of open space in the Alternatives (China Basin Channel and open space associated with residential, office and S/LI/RD uses). See Table VI.D.15, p. VI.D.77.

SOURCE: Environmental Science Associates, Inc.

---

high need areas./127/ Open space developed between 2000 and 2020 would help further address the open space needs of those Nearby Areas to varying degrees under the Alternatives. Open space in the Project Area with all Alternatives also would help to serve the needs of the North Potrero Hill and Potrero Hill Nearby Areas, although the Recreation and Open Space Element does not identify those areas as "areas not served by public open space."

Alternative A

As summarized in Table VI.D.15, p. VI.D.77, in the year 2020, open space would total 71.3 acres (43.3 acres parkland; 28 acres associated with other uses, and China Basin Channel), an addition of 20.2 acres to the open space provided by 2000. In addition to the five major open space areas developed by 2000 (described on p. VI.D.72), the following five major open space areas would be provided by the year 2020. These areas are shown in Figure VI.D.6, p. VI.D.62.

- OS-6: A three-acre area along the northern shore of the channel would be used for passive recreation activities.
- OS-7: A one-acre area abutting the northern shore of the channel, south of Berry Street and near the freeway would provide an active recreation area.
- OS-8: An 0.5-acre area at the western end of the channel would provide passive open space for workers from S/LI/RD uses, and would continue public access around the channel.
- OS-9: An open space strip from Alameda Street to 16th Street would provide 3.4 acres for passive recreation opportunities and would include a paved walking and biking path. The path would connect to the path developed by the year 2000 from the houseboat area to Alameda Street (OS-4), providing a continuous open space path from the houseboat area to 16th Street.
- OS-10: A 0.4-acre strip between 15th and 16th Streets would continue the open space path from OS-9.
- OS-11: A 1.6-acre open space strip with a paved walking and biking path would run southeast from the closed Fire Station 30 to China Basin Street and then west to Alameda Street.

As presented in Table VI.D.17, p. VI.D.80, total parkland under Alternative A at build-out/2020 would require about 20 gardening and landscape maintenance workers, and five and one-half custodian positions. Recreation programs at active sports areas and recreation buildings would require about 8.5 recreation directors.

Project Area resident need for about 72 acres of neighborhood- and district-serving parkland and employee need for about 3.5 acres would exceed the 43.3 acres of parkland provided (see Table VI.D.18, p. VI.D.81). Nonetheless, the addition of one acre of active parkland and 8.9 acres of passive parkland beyond the areas provided by the year 2000 would be well-located to serve residents and employees. By the year 2020, all land uses would be within about 700 feet of Project Area parkland. Project Area residents would live within walking distance of parkland that would provide a variety of passive and active recreation opportunities for residents of all age groups. Residents also would use about 4.4 acres of open space such as courtyards, tot lots and plazas provided as part of the individual housing developments. Project Area employees would work within walking distance of parkland. In addition to parkland, office buildings would provide about five acres of open space within office blocks and S/LI/RD developments would provide about 6.5 acres. Total open space associated with other uses would be 16 acres. Employees and users of community facilities, retail employees and customers, and hotel workers and guests similarly would be near the Project Area open space.

New Mission Bay open space would help serve the open space needs of Nearby Areas. Parts of the South of Market and Showplace Square Nearby Areas would be located within the neighborhood service areas of OS-6 and OS-7 on the north side of the channel. The South of Market Nearby Area would link up with the Project Area open space network via Third, Fourth and Fifth Streets. Pedestrians from Showplace Square would be near OS-8 at the western end of the channel, under the I-280 freeway. The addition of the open space path from Alameda Street to 16th Street (OS-9 and OS-10) would help connect the Lower Potrero Hill Nearby Area and the southern part of the Central Bayfront Nearby Area to Mission Bay open space opportunities.

Alternative B

As summarized in Table VI.D.15, p. VI.D.77, at build-out/2020, open space would total 102.4 acres (82.1 acres of parkland and wetlands; 8.3 acres associated with other uses and China Basin Channel), an addition of 58.8 acres to the open space that would be provided by the year 2000. Figure VI.D.7, p. VI.D.63, shows the seven open space areas that would be developed by the year 2020, in addition to the four major open space areas that would be developed by the year 2000 (described on p. VI.D.74):

- OS-5: A 13.2-acre rectangular area between Hooper and Hubbell Streets would provide areas for active sports.
- OS-6: A 7.3-acre area would be bounded by the southern shore of the channel. Third and Fourth Streets. About six acres there would provide access to the channel shoreline and areas for active sports. A 1.2-acre triangular area north of the intersection of Third and Fourth Streets would provide an area for passive recreation activities.

- OS-7: A 13.6-acre wetlands area east of Third Street would open into China Basin.
- OS-8: A 0.9-acre area and a 1.5-acre area would form a passive open space strip between Third Street near Yuma Street to Hubbell Street. This area would accommodate a paved walking and biking path that would extend from Hooper Street south to Third Street near Yuma Street.
- OS-9: A 2.8-acre area north of Yuma Street, at the intersection of Yuma and Third Streets would be devoted to active sports areas.
- OS-10: A 6.3-acre area south of Yuma Street and adjacent to the seven-acre wetlands would provide areas for passive recreation.
- OS-11: A third, seven-acre wetlands area south of Yuma Street would open into the Bay between Piers 54 and 64.

As shown in Table VI.D.17, p. VI.D.80, total open space in Alternative B at build-out/2020 would require about 24 gardening and landscape maintenance workers, and about six custodians. Recreation programs at active sports areas and recreation buildings would require about 10.5 recreation directors.

Project Area resident need for about 93 acres of neighborhood and district parkland and employee need for about one acre would be met by the approximately 82 acres of parkland and wetlands open space provided (see Table VI.D.18, p. VI.D.81). Whereas no active open space areas suitable for field and court sports and recreation buildings would be provided by the year 2000, by 2020, Alternative B would add about 22 acres of active open space to serve its residential population.

As with Alternative A, all Project Area residential and non-residential land uses would be located within about 700 feet of Project Area parkland. Residents would live within walking distance of parkland that would offer a variety of passive and active recreation areas, and also would be served by about 6.4 acres of open space such as tot lots, courtyards and plazas provided as part of housing developments. Project Area employees would work within walking distance to parkland. The approximately one million square feet of office space also would include about one acre of open space; and about 0.8 acre of the six-acre S/LI/RD block would be devoted to open space. Total open space associated with other uses would be about 8 acres. Parkland would similarly be accessible to community facilities employees, and retail employees and customers.

In addition to the parkland and open space associated with housing, office and S/LI/RD uses, Alternative B would provide three wetland areas (OS-2, OS-7 and OS-11) totalling about 34 acres. The wetlands would have contoured, natural edges, berms with trees and nesting islands or waterfowl. Pedestrian paths and observation areas with educational signage would be provided to enhance their educational and recreational benefits. The wetlands would provide a visual, educational and recreational resource for Project Area residents and employees and for other residents of the City and visitors. Wetlands acreage in Alternative B, compared to no wetlands in Alternative A, would be a trade-off between passive and active space which could more directly serve the needs of resident and employee populations.

As with Alternative A, Mission Bay open space would help serve the open space needs of the South of Market and Showplace Square Nearby Areas. South of Market residents and employees would connect with the Project Area open space network via Third, Fourth and Fifth Streets. The neighborhood service areas of open space with Alternative B, in contrast to Alternative A, would not extend to Lower Potrero Hill or the southern part of Central Bayfront, although residents and employees from those areas, as well as from other areas in the City such as the Inner Mission, may be attracted to the variety and quantity of open space provided with this Alternative.

Alternative N

As summarized in Table VI.D.15, p. VI.D.77, Alternative N open space would total 17.2 acres, including 5.2 acres of passive parkland and the 12-acre channel. No wetlands, parkland for active sports, or open space associated with other uses would be provided. Figure VI.D.8, p. VI.D.64, shows the open space areas that would be provided by the year 2020. In addition to the open space provided along the southern shoreline of the channel by the year 2000, a 1.8-acre passive open space strip would be provided along the northern shoreline of the channel between Fourth and Sixth Streets (OS-4) by the year 2020.

Maintenance of parkland under Alternative N would require about 2.5 gardeners' work time. Custodial services would be provided by mobile crews. Because active open space would not be provided, no recreation directors would be needed (see Table VI.D.18, p. VI.D.81).

Houseboat resident demand for about 0.2 acre of open space and employee demand for about 2.4 acres would be exceeded by the 5.2 acres of parkland provided. Because Project Area open space would be limited to the channel shoreline (OS-1, OS-2, OS-3 and OS-4), houseboat residents and employees in office and M-2 Industrial space north of the channel and in M-2 Industrial space directly south of the channel would be better served than would employees further to the south. Some of the southern blocks would be located as far as three-quarters of a mile (about a 15-minute walk) from Project Area open space. Employees in those blocks would be located about 1,300 feet or less from existing recreation opportunities near the Project Area such as, Agua Vista Park or the Mission Rock Resort deck (see Setting Figure VI.D.3, p. VI.D.12).

As would be the case in the year 2000, the additional 1.8 acres of the open space provided along the north side of the channel (OS-4) would help serve the South of Market and Showplace Square Nearby Areas, but to a lesser degree than under Alternative A or B (see p. VI.D.83).

Public Plans and Policies

Table VI.D.19 compares the Alternatives to several policies from the Recreation and Open Space Element of the Master Plan, Central Waterfront Plan and the Bay Conservation and Development Commission's Special Area Plan for the San Francisco Waterfront. Table VI.D.19 covers the years 2000 and 2020 and identifies the policies that would, or would not, be addressed by development under each of the Alternatives.

By 2020, Alternatives A and B would respond to all policies listed in the table. Under Alternative N, two policies would not be addressed by the year 2020. The Eastern Shoreline Plan (Map 8) of the Recreation and Open Element calls for providing new open space in the general vicinity of the area encompassed by the channel and China Basin, Mission Rock and Fourth Streets. Except for an 0.8-acre open space strip on the shore of the channel, that would not be provided under Alternative N. China Basin Policy 3 of BCDC's Special Area Plan for the San Francisco Waterfront would reserve the area immediately east of the Third Street Bridge on the south side of China Basin for public access and viewing areas. Under Alternative N, that would not be provided. A 2.9-acre area, however, in this location would be developed for M-2 industrial uses. Depending on the specific use, however, BCDC could require through its permit that public open space be included at that location.

LIBRARIES

City policy is to consider addition of new neighborhood branch libraries when population within a one-mile radius is at least 35,000. The number of existing branches in

TABLE VI.D.19: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OPEN SPACE OBJECTIVES AND POLICIES OF THE RECREATION AND OPEN SPACE ELEMENT, CENTRAL WATERFRONT PLAN AND BCDC SPECIAL AREA PLAN FOR THE SAN FRANCISCO WATERFRONT, 2000 AND BUILD-OUT/2020

Objective or Policy	Alternative A	Alternative B	Alternative N
Recreation and Open Space Element of the Master Plan/a/			
1. Shoreline Policy 1, Land Use			
Priority Land Uses: New development adjacent to the shoreline providing substantial long-term public benefits that cannot be provided on other sites in the City, including maritime shipping and freight-handling facilities, public recreation and open space, commercial fishing and water-related industrial uses.	Only direct interface of Mission Bay Project Area with Bay is at China Basin Channel. All new development within the channel would be public recreation and open space.	Same as Alternative A.	By the year 2000, the south shoreline of the channel would be developed as open space. The north shoreline would be developed as open space by the year 2020. However, the 2.9-acre area on the south side of China Basin, east of Third Street and north of China Basin Street, is assumed to be developed with M-2 uses by 2020. Uses other than maritime and public access would not respond to this policy.
Restricted and Prohibited Land Uses: Include office, residential, water-related commercial uses (restaurants, hotels, shops) and non-water-related industrial uses. Recreation-oriented commercial services should be permitted on land adjacent to open space areas.	No restricted land uses are proposed for parts of the Project Area that are adjacent to the shoreline. Recreation-oriented commercial services could be accommodated in retail areas adjacent, or in proximity, to the open space areas abutting the shoreline. The existing houseboat community would remain.	Same as Alternative A.	Under M-2 zoning, restricted land uses could develop fronting China Basin. It is not likely that recreation-oriented commercial services would develop in M-2-zoned areas near open space areas, due to limited size of open space to support them. The existing houseboat community would remain.
2. Shoreline Policy 1, Open Space/ Urban Design			
All new non-maritime developments on property abutting the shoreline should provide and maintain on their sites ground-level open space, well situated for public access and designed for maximum physical and visual contact with water.	All new development on property abutting the shoreline would be ground-level public recreation and open space. All housing and S/LI/RD and office buildings abutting the shoreline open space also would have publicly accessible open space associated with them.	Same as Alternative A.	North and south shores of the channel would be developed as ground-level open space. No open space would be required under M-2 zoning for development abutting China Basin or the proposed shoreline open space.
3. Map 7, Northeastern Shoreline Plan, Eastern Shoreline - Mission Bay, Shoreline Policy 3, and Map 8, Eastern Shoreline Plan			
Provide new open space along the shoreline of the China Basin Channel, develop channel shoreline (north and south) to maximum public access and recreational use that	By the year 2000, no open space would be provided along the north side of the channel; about 12 acres of new open space would be provided along, and south of, the channel's southern shoreline.	By the year 2000, 11 acres of new open space would be provided along the northern shoreline of the channel; about five acres of parkland and 13 acres of wetlands	By the year 2000, no open space would be provided along the north side of the channel; 3.4 acres would be provided along the south side. By year 2020, 1.8 acres of new open space would be

(Continued)

TABLE VI.D.19: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OPEN SPACE OBJECTIVES AND POLICIES OF THE RECREATION AND OPEN SPACE ELEMENT, CENTRAL WATERFRONT PLAN AND BCDC SPECIAL AREA PLAN FOR THE SAN FRANCISCO WATERFRONT, 2000 AND BUILD-OUT/2020 (continued)

Objective or Policy	Alternative A	Alternative B	Alternative N
could accommodate a trail to link with a shoreline trail around the City's perimeter.	By the year 2020, four acres of new open space would be provided along the northern shoreline. That open space could accommodate a shoreline trail.	would be provided along, and south of, the channel's southern shoreline. By the year 2020, about six additional acres of open space would be provided on the channel's southern shore. Channel shoreline open space areas could accommodate a trail, but a trail would need to be diverted south of the wetlands to avoid excessive human intrusion.	provided along the channel's northern shoreline. Channel shoreline open space could accommodate trail east to Third Street.
4. Map 8, Eastern Shoreline Plan			
Accommodate a proposed shoreline trail along China Basin Street.	Open space strip from just south of Third/Mission Rock intersection to Alameda Street could accommodate a shoreline trail. Development in Project Area would not conflict with a continuation of the trail south along China Basin Street.	Development in the Project Area would not conflict with continuation of the trail south along China Basin Street; the trail would need to be diverted around bayfront wetlands.	Development in the Project Area would not conflict with a continuation of the trail south along China Basin Street.
Provide new open space in general vicinity of area encompassed by channel and China Basin, Mission Rock and Fourth Streets.	By the year 2000, 16.2 acres of new open space provided in that area. Hotel and residential uses also proposed for Banana Triangle.	Not provided by the year 2000. By the year 2020, 7.3 acres of parkland and 13.6 acres of wetlands would be provided in this area.	Not provided, except for 0.8-acre open space strip on the southern shoreline of the channel. Development under M-2 zoning in remainder of the area.
Maintain and expand Agua Vista Park.	Development in Project Area would not conflict with maintaining and improving off-site public boat launch ramp.	Same as Alternative A.	Same as Alternative A.
Maintain and improve Pier 54 public boat launch ramp.	Development in Project Area would not conflict with maintaining and expanding off-site Agua Vista Park.	Same as Alternative A.	Same as Alternative A.
5. Neighborhoods Policy 5			
Require private usable outdoor open space in new residential development.	In addition to public open space, individual residential units would provide private open space which could include outdoor patios and balconies.	Same as Alternative A.	No new residential development.
6. Neighborhoods Policy 6			
Assure the provision of adequate public open space to serve new residential development.	In addition to major public open spaces and private open space, individual residential blocks would provide public open space that could include	Same as Alternative A; by the year 2000, open space associated with housing would total about 1.3 acres; by 2020, about 6.4 acres.	No new residential development.

(continued)

TABLE VI.D.19: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OPEN SPACE OBJECTIVES AND POLICIES OF THE RECREATION AND OPEN SPACE ELEMENT, CENTRAL WATERFRONT PLAN AND BCDC SPECIAL AREA PLAN FOR THE SAN FRANCISCO WATERFRONT, 2000 AND BUILD-OUT/2020 (continued)

Objective or Policy	Alternative A	Alternative B	Alternative N
	courtyards, plazas and tot lots. By the year 2000, this open space associated with housing would total about 1.4 acres; by 2020, about 4.4 acres.		
7. Neighborhoods Policy 7			
Provide open space to serve neighborhood commercial districts.	All neighborhood retail space would be located within 500 feet of major public open space such as two-acre central square, channel shoreline open space and 14.6-acre waterfront park.	Most neighborhood commercial (retail) space would be located within 500 feet of major public open space such as channel parkland and wetlands, and open space corridor between Hubbell and Third Streets. Remaining retail space on Daggett Street would be located within 1,000 feet of major public open space.	Retail areas would be located within 1,500 feet of open space areas along the channel.
8. Citywide System, Policy 6			
Make open spaces accessible to all user groups, including people with special needs such as seniors, young children and people with disabilities.	By the year 2000 and more so by the year 2020, the amount, number and sizes of open space areas could provide a wide range of passive and active open space and recreation opportunities. Open space areas could be designed to accommodate the needs of all user groups.	Same as Alternative A, except that active open space areas would not be provided by year 2000 (but would be by 2020). Wetlands areas may not allow as wide a range in open space and recreation opportunities compared to Alternative A.	Passive, but not active, open space areas would be provided. Although those areas could be designed to accommodate needs of various user groups, the total amount of open space and the number and sizes of separate open space areas would not be sufficient to provide a wide degree of variation in open space and recreation opportunities.
9. Citywide System, Policy 7			
Acquire additional open space for public use.	By the year 2020, development of Mission Bay would add about 43 acres of parkland to the City's open space.	By the year 2020, Mission Bay would add about 48 acres of parkland and 34 acres of wetlands to the City's open space.	By the year 2020, parkland improvements along the north and south shores of the channel would add about five acres to the City's open space.
10. Citywide System, Policy 8			
Develop a citywide urban trails system that links City parks and public open space, the waterfront, and neighborhoods.	Open space along the channel, at China Basin, and in a path from Third and Fourth Streets to Alameda Street would link residents and workers from the Project Area and Nearby Areas to the waterfront. Paths along the channel and from Tiernan Street to 16th Street would help connect pedestrians from the Project Area and Nearby Areas to the Project Area open space network.	Open space along the channel would help link pedestrians from Project Area and Nearby Areas to the waterfront. Wetlands at China Basin and between Piers 54 and 64 could include pedestrian paths that would link pedestrians to waterfront. Paths along the channel and from Third Street to Hubbell Street would help connect pedestrians from Project Area and Nearby Areas to the Project Area open space network.	Open space along the channel would help link pedestrians from Project Area and Nearby Areas to the waterfront.

(continued)

TABLE VI.D.19: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OPEN SPACE OBJECTIVES AND POLICIES OF THE RECREATION AND OPEN SPACE ELEMENT, CENTRAL WATERFRONT PLAN AND BCDC SPECIAL AREA PLAN FOR THE SAN FRANCISCO WATERFRONT, 2000 AND BUILD-OUT/2020 (continued)

Objective or Policy	Alternative A	Alternative B	Alternative N
Central Waterfront Plan (Element of the Master Plan)/b/			
1. China Basin Area Objective 2, Policy 1			
Develop new waterfront recreation area on both sides of channel west of Fourth Street for public access, viewing, waterfront recreation, compatible with maritime activities west of Pier 62 and maintain existing commercial recreation and housing uses; develop pedestrian promenade and bike path on north side of channel between Third and Fourth Streets.	By the year 2000, new waterfront open space and recreation areas would be provided along the south shore of the channel. By the year 2020, both sides of the channel west of Fourth Street would be developed for public access, viewing, and recreation. Open space development along the channel could provide continuation of a pedestrian promenade and bike path from the north side of the channel between Third and Fourth Streets. Public viewing and fishing areas could be accommodated west of Pier 62. Assumes Port retains the current 35 pleasure craft and 20 houseboats berths. Port may retain restaurant at Pier 60 (Carmen's).	Same as Alternative A, except that both sides of the channel west of Fourth Street would be developed for parkland, recreation and wetlands by the year 2000 instead of 2020. Assumes Port reduces number of pleasure craft berths from 35 to 20.	Same as Alternative A.
2. Central Basin Area Objective 3, Policy 2 and Policy 3			
Improve and expand Agua Vista Park by developing a public beach and waterfront park and a small marina, so long as consistent with maritime and ship repair activities. Continue use of Pier 52 public boat launch ramp.	Development in Project Area would not conflict with improving and expanding Agua Vista Park, nor continued use of Pier 52 public boat launch ramp.	Same as Alternative A.	Same as Alternative A.
BCDC Special Area Plan for the San Francisco Waterfront/c/			
1. China Basin Policy 1			
Provide continuous public access, consistent with maritime activities, around channel.	Assuming a public access route could be provided through parking area, and near pump station at west end of the channel, public open space development would provide continuous public access around the channel.	Same as Alternative A, although public access route would be diverted around wetlands on south side of the channel.	Assuming a public access route could be provided through rail property under the freeway, pump station property at the western end of the channel, and the M-2 zoned area at the southwestern end of the channel, new public open space would provide continuous public access around channel.

(continued)

TABLE VI.D.19: RELATIONSHIP BETWEEN MISSION BAY ALTERNATIVES AND OPEN SPACE OBJECTIVES AND POLICIES OF THE RECREATION AND OPEN SPACE ELEMENT, CENTRAL WATERFRONT PLAN AND BCDC SPECIAL AREA PLAN FOR THE SAN FRANCISCO WATERFRONT, 2000 AND BUILD-OUT/2020 (continued)

Objective or Policy	Alternative A	Alternative B	Alternative N
2. China Basin Policy 2			
Permit limited Bay-oriented commercial recreation along channel, provided it is incidental to and does not obstruct public access.	Retail areas along the north side of the channel could accommodate Bay-oriented commercial recreation activities by the year 2020.	Retail, which would be located about one block away from the channel by 2000, could accommodate Bay-oriented commercial recreation activities.	Same as Alternative A. Port-related/ M-2 areas within one block of the channel could include Bay-oriented commercial recreation enterprises by 2000.
3. China Basin Policy 3			
Reserve area immediately east of Third Street Bridge on south side of China Basin for public access, with special consideration to providing public view areas.	By the year 2000, a 2.9-acre open space area would be provided east of Third Street Bridge on the south side of China Basin, between China Basin and China Basin Street.	Not provided by year 2000. By year 2020, China Basin wetlands east of Third Street at mouth of the channel could provide view areas.	Not specifically provided. By the year 2020, 2.9 acres in that location would be developed under M-2 zoning. Depending on use, BCDC permit could require that public open space be included.
4. Piers 50-54 Policy 2			
Retain Pier 52 public boat launch ramp.	Development in Project Area would not conflict with retaining Pier 52 public boat launch ramp.	Same as Alternative A.	Same as Alternative A.
5. Central Basin Policy 1			
Continue to develop Central Basin (Agua Vista Park) for public access and waterfront recreation.	Development in Project Area would not conflict with continued development of Agua Vista Park.	Same as Alternative A.	Same as Alternative A.
6. Central Basin Policy 2			
When it is no longer needed for maritime activity, develop Pier 64 for park and marina use.	Development in Project Area would not conflict with development of Pier 64 for park and marina use.	Same as Alternative A.	Same as Alternative A.

BCDC - Bay Conservation and Development Commission

/a/ San Francisco Department of City Planning, Recreation and Open Space Element of the Master Plan, adopted by City Planning Commission Resolution 11065, July 9, 1987.
/b/ San Francisco Department of City Planning, Central Waterfront Plan, adopted by City Planning Commission Resolution 8631, July 3, 1980.
/c/ San Francisco Bay Conservation and Development Commission, San Francisco Waterfront Special Area Plan, adopted April 1975, as amended.

SOURCE: Environmental Science Associates, Inc.

San Francisco exceeds that ratio, and the City plans to consolidate library services among fewer branches in the future./129/ When calculating the demand for branch services, employees in an area are not included because they generally use libraries near their place of residence or visit the Main Branch for specialized technical information.

2000

Alternative A

Mission Bay residents would be expected to patronize the Potrero Branch, about one-half mile south of the Project Area, or the Main Branch at the Civic Center. Alternative A population in 2000 would be about 5,400. Together with an estimated population of about 10,000 within one-half mile of Project Area boundaries in Rincon Point - South Beach, South of Market, and Potrero Hill in the year 2000 (of which 6,500 would be Potrero Hill residents), the total population of 15,400 would not meet the 35,000 population criteria for a new branch library./130/ The proposed new Main Library at the Civic Center, if funded and built, would provide expanded, improved citywide library services./131/

Initial Phase of Development. The initial phase for Alternative A would not substantially increase demand for library services.

Alternative B

The effects of Alternative B would be similar to those of Alternative A. About 5,000 people would live in the Project Area by 2000.

Initial Phase of Development. The initial phase for Alternative B would not substantially increase demand for library service.

Alternative N

The approximately 36 persons residing in the Mission Bay houseboats would not increase existing demand for library services.

Build-Out/2020

Alternative A

About 14,400 people would reside in Mission Bay in 2020; population in Mission Bay by itself would not support a new branch library. Within about one-half mile of Mission Bay boundaries, 2020 population would be about 13,000 in South of Market, Rincon Point - South Beach and Potrero Hill./130/ That population of about 27,400 would continue to patronize the Potrero Branch or the Main Branch at the Civic Center, and would not meet criteria for a new branch library.

Alternative B

Alternative B population in 2020 would be about 18,600; the effects of Alternative B would be similar to those of Alternative A, with a service area population of about 31,600.

Alternative N

Alternative N population would be about 36 in 2020, and would not increase demand for library services.

PUBLIC HEALTH SERVICES

Estimates of Mission Bay impacts on Department of Public Health (DPH) services were derived from information provided by DPH. The services reviewed include emergency medical services; community mental health services; environmental health services (hazardous material, rodent control); hospital administration; water quality monitoring in China Basin Channel; and general effects on homeless persons programs.

For Emergency Medical Services, San Francisco demand factors were applied to Mission Bay land uses and population. For Community Mental Health Services, national and state population-at-risk factors were similarly applied. These two services are discussed by analysis years and Alternatives. Other services or impacts that cannot be substantially differentiated by analysis year or Alternative are discussed briefly. Demand factors are presented in Appendix D. Community Services and Infrastructure, p. XIV.D.33, and risk factors are presented in Tables XIV.D.31 and XIV.D.32, pp. XIV.D.35 and XVI.D.36.

Community Public Health Program – Environmental Health Services

Hazardous Materials

One health inspector can inspect up to 23 sites per month for hazardous materials storage compliance. All new Mission Bay business establishments using hazardous materials listed by DPH would need to be inspected./132/ The increase in S/LI/RD or industrial businesses which might handle hazardous materials would necessitate a corresponding increase in hazardous materials monitoring.

Rodent Control

Rodents are present in the Project Area, and have been sighted along China Basin Channel and under Pier 48 near available food supplies such as sewage effluent or trash. DPH sets baited traps to reduce the rodent population and to obtain specimens to test for plague infestation. Poison is usually placed in sewage catch basins, although there is no regular sewer poisoning program. If rodent habitat were disturbed (i.e., a building demolished or channel wetland constructed), the animals would commonly move into the adjacent buildings in search of food, shelter and water. The rat population in San Francisco has declined in recent years due to DPH efforts in enforcing garbage clean-up./133/ Under all Alternatives, new buildings would be constructed and maintained. Garbage would therefore be removed and the number of rats would be reduced.

Hospital Administration

The increase in residential population in the Project Area would exert additional demands on the South of Market Health Center (SMHC) outpatient services, if no new facility were constructed. That center is currently operating beyond capacity (see Setting p. VI.D.21)./134/

Water Quality

Water quality in China Basin Channel is expected to improve under Alternatives A and B, as described in VI.L. Hydrology and Water Quality, beginning on p. VI.L.22. Local populations would substantially increase in the vicinity of the channel under Alternatives A and B; public uses such as fishing and swimming could occur. In the event of a sewage overflow, fish could become contaminated and swimmers could be subject to disease.

Homeless Population

Currently, the Mayor's Program for the Homeless provides 3,700 spaces to house the City's homeless in residential hotels and shelters. Additional shelters are run by non-profit and church groups. Information on total number of homeless is not available./135/ Homeless people or transients now settle near piers or under freeways in the Project Area. If displaced by development of all Alternatives, including removal of the freeway stub, they would be expected to move north into the South of Market and Nearby Areas because of their proximity to soup kitchens and shelters.

2000

Emergency Medical Services

Table VI.D.20 presents estimates of annual City ambulance responses to the Project Area in 1985 and for each Alternative in 2000. Table VI.D.20 presents estimates of the DPH paramedics staff and vehicles required to serve the calls. Estimates of total ambulance calls and City responses to the Project Area were estimated using DPH and Fire Department statistics on emergency medical responses. Estimates of DPH staff and vehicles required to handle the increase in calls were based on existing staffing patterns. Appendix D. Community Services and Infrastructure, p. XIV.D.33 discusses in more detail the method used to calculate the estimates.

Community Mental Health Services

Table XIV.D.31, p. XIV.D.35 in Appendix D presents DPH estimates of population-at-risk for mental health illness in Mission Bay at 2000. Estimates are based on population-at-risk data derived from national epidemiological studies and published by the State Department of Mental Health./136/ The data represent the number of people in the population at any given time who would be at risk of needing mental health services. Risk levels are defined as Low, Medium and High. The low-risk population includes those who might use consultation, education, prevention or early intervention services. The

Community Public Health Program - Environmental Health Services

Hazardous Materials

One health inspector can inspect up to 23 sites per month for hazardous materials storage compliance. All new Mission Bay business establishments using hazardous materials listed by DPH would need to be inspected./132/ The increase in S/LI/RD or industrial businesses which might handle hazardous materials would necessitate a corresponding increase in hazardous materials monitoring.

Rodent Control

Rodents are present in the Project Area, and have been sighted along China Basin Channel and under Pier 48 near available food supplies such as sewage effluent or trash. DPH sets baited traps to reduce the rodent population and to obtain specimens to test for plague infestation. Poison is usually placed in sewage catch basins, although there is no regular sewer poisoning program. If rodent habitat were disturbed (i.e., a building demolished or channel wetland constructed), the animals would commonly move into the adjacent buildings in search of food, shelter and water. The rat population in San Francisco has declined in recent years due to DPH efforts in enforcing garbage clean-up./133/ Under all Alternatives, new buildings would be constructed and maintained. Garbage would therefore be removed and the number of rats would be reduced.

Hospital Administration

The increase in residential population in the Project Area would exert additional demands on the South of Market Health Center (SMHC) outpatient services, if no new facility were constructed. That center is currently operating beyond capacity (see Setting p. VI.D.21)./134/

Water Quality

Water quality in China Basin Channel is expected to improve under Alternatives A and B, as described in VI.L. Hydrology and Water Quality, beginning on p. VI.L.22. Local populations would substantially increase in the vicinity of the channel under Alternatives A and B; public uses such as fishing and swimming could occur. In the event of a sewage overflow, fish could become contaminated and swimmers could be subject to disease.

Homeless Population

Currently, the Mayor's Program for the Homeless provides 3,700 spaces to house the City's homeless in residential hotels and shelters. Additional shelters are run by non-profit and church groups. Information on total number of homeless is not available./135/ Homeless people or transients now settle near piers or under freeways in the Project Area. If displaced by development of all Alternatives, including removal of the freeway stub, they would be expected to move north into the South of Market and Nearby Areas because of their proximity to soup kitchens and shelters.

2000

Emergency Medical Services

Table VI.D.20 presents estimates of annual City ambulance responses to the Project Area in 1985 and for each Alternative in 2000. Table VI.D.20 presents estimates of the DPH paramedics staff and vehicles required to serve the calls. Estimates of total ambulance calls and City responses to the Project Area were estimated using DPH and Fire Department statistics on emergency medical responses. Estimates of DPH staff and vehicles required to handle the increase in calls were based on existing staffing patterns. Appendix D. Community Services and Infrastructure, p. XIV.D.33 discusses in more detail the method used to calculate the estimates.

Community Mental Health Services

Table XIV.D.31, p. XIV.D.35 in Appendix D presents DPH estimates of population-at-risk for mental health illness in Mission Bay at 2000. Estimates are based on population-at-risk data derived from national epidemiological studies and published by the State Department of Mental Health./136/ The data represent the number of people in the population at any given time who would be at risk of needing mental health services. Risk levels are defined as Low, Medium and High. The low-risk population includes those who might use consultation, education, prevention or early intervention services. The

TABLE VI.D.20: ESTIMATED ANNUAL CITY AMBULANCE RESPONSES AND PARAMEDIC AND VEHICLE REQUIREMENTS FOR THE PROJECT AREA, BY ALTERNATIVE, 1985 AND 2000/a/

		Alternative A		Alternative B		Alternative N	
	1985	2000	1986-2000	2000	1986-2000	2000	1986-2000
City Responses/b/	20	380	+360	350	+330	40	+20
Paramedics/c/	0.02	0.4	+0.38	0.4	+0.38	0.04	+0.02
Vehicles/d/	0.01	0.1	+0.09	0.1	+0.09	0.01	+0.00

/a/ These estimates are for ambulance service provided by the Paramedic Division of San Francisco General Hospital and do not include back-up service provided by private ambulance companies.

/b/ Total ambulance calls include Code 1, 2 and 3 calls (see p. VI.D.?? for definitions of code calls). The City's ambulance service reponds to about 75% of total ambulance calls.

/c/ Paramedics estimates of are based on a citywide factor of 960 calls per paramedic per year.

/d/ Vehicle estimates are based on a citywide factor of each City ambulance handling about 3,570 calls per year.

SOURCE: Environmental Science Associates, Inc., based on information provided by the San Francisco Department of Public Health.

medium-risk cases are those who might need outpatient treatment with occasional inpatient stay. The high-risk population cases include those who might need inpatient care. Each individual in a particular risk category would not necessarily become ill or seek treatment. Most mental health patients would rely on DPH services, since few health insurance providers cover mental health needs. The increase in population-at-risk applies only to Mission Bay residents under Alternatives A and B; the residential population at risk under Alternative N would remain as existing.

Some of the additional services required for Mission Bay residents would be provided at existing buildings. Acute inpatient services would be provided through the purchase of additional beds in acute hospitals. Long-term care needs could be met at Napa State Hospital, the new sub-acute facility proposed to be constructed at San Francisco General Hospital, or through contracted private hospital beds. Emergency outpatient services, consultation, education, information, and mental health advocacy services would be provided through existing facilities.

Other services would require expansion of existing buildings, additional employees or new space in the Project Area or elsewhere in the City to accommodate Mission Bay residents at high risk of needing services./136/

Alternative A

As shown in Table VI.D.20, p. VI.D.96, by the year 2000, the City ambulance service would respond to about 380 calls in the Project Area each year, an increase of about 360 calls over the estimate for 1985. About half of a paramedic's work time would need to be allocated to serve that level of calls. About one-tenth of a City ambulance's service time would be devoted to calls in Mission Bay.

Appendix D. Table XIV.D.31, p. XIV.D.35, shows population at risk of mental illness for Alternative A.

Initial Phase of Development. In the initial phase of development, the City ambulance service would respond to about 70 calls in the Project Area each year. Those calls would be handled by existing staff and vehicles.

Alternative B

By the year 2000, the City ambulance service would respond to about 350 Project Area calls each year, an increase of about 330 calls over 1985. There would be about 30 fewer calls than with Alternative A; calls under Alternative B would require about the same amount of paramedic and vehicle support as under Alternative A.

Appendix D. Table XIV.D.31, p. XIV.D.35, shows that total population at risk of mental illness with Alternative B would be higher than that of Alternative A because of the greater population of Alternative B.

Initial Phase of Development. In the initial phase of development, City ambulances would respond to about 55 calls in the Project Area each year. That amount of calls would be handled by existing staff and vehicles.

Alternative N

With Alternative N, the City ambulance service would respond to about 40 calls in the Project Area in the year 2000, an increase of about 20 calls over the 1985 estimate. DPH would need to allocate less than one-tenth of a paramedic's work time and less than one-tenth of an ambulance to calls in Mission Bay.

Build-Out/2020

By build-out, Emergency Medical Services would need to increase paramedic staff and vehicles as shown in Table VI.D.21. Mission Bay population at risk of mental health illness would increase from 2001-2020, as presented in Appendix D. Table XIV.D.32, p. XIV.D.36.

Alternative A

In 2020, the City ambulance service would respond to about 1,000 calls per year, an increase of about 620 over the estimated level of calls in the year 2000 and an increase of about 980 calls over those in 1985 (see Table VI.D.21). DPH would need to allocate about one full-time paramedic position to handle that level of calls. About one-third of a vehicles service time would be devoted to calls in Mission Bay.

TABLE VI.D.21: ESTIMATED ANNUAL CITY AMBULANCE RESPONSES AND PARAMEDIC AND VEHICLE REQUIREMENTS FOR THE PROJECT AREA, BY ALTERNATIVE, 2000 AND BUILD-OUT/2020/a/

		Alternative A			Alternative B			Alternative N		
	1985	2000	2020	2001-2020	2000	2020	2001-2020	2000	2020	2001-2020
City Responses/b/	20	380	1,000	+620	350	1,300	+950	40	+20	+80
Paramedics/c/	0.02	0.4	1	+0.6	0.4	1.4	+1.0	0.04	0.1	+0.06
Vehicles/d/	0.01	0.1	0.3	+0.2	0.1	0.4	+0.3	0.01	0.03	+0.02

/a/ These estimates are for ambulance service provided by the Paramedic Division of San Francisco General Hospital and do not include back-up service provided by private ambulance companies.
/b/ Total ambulance calls include Code 1, 2 and 3 calls (see p. VI.D.22). The City's ambulance service reponds to about 75% of total ambulance calls.
/c/ Paramedics estimates are based on a citywide factor of 960 calls per paramedic per year.
/d/ Vehicle estimates are based on a citywide factor of each City ambulance handling about 3,570 calls per year.

SOURCE: Environmental Science Associates, Inc.

Appendix D. Table XIV.D.32, p. XIV.D.36, shows population at risk of mental illness for Alternative A.

Alternative B

Under Alternative B, the City ambulance service would respond to about 1,300 calls per year in the Project Area, an increase of about 950 calls over the level estimated for the year 2000 and an increase of about 1,280 over those in 1985. Those calls would require about one and one-half paramedic positions. About half of a vehicle's service time would be devoted to Mission Bay calls.

Appendix D. Table XIV.D.32, shows that total population at risk of mental illness with Alternative B would be higher than that of Alternative A because of the greater population of Alternative B.

Alternative N

Under Alternative N, the City ambulance service would respond to about 120 calls in the Project Area per year, an increase of about 80 calls over the year 2000. That level of calls would require about one-tenth of a paramedic's work time. One City ambulance would spend less then one-tenth of its service time in Mission Bay. It is not likely that an increase in either personnel or equipment would be justified under this Alternative at 2020.

WATER SUPPLY

2000

Citywide System

The San Francisco Water Department's projected average city-wide water demand for the year 2000 is 99.8 million gallons per day (mgd)./137/ That represents a 5% increase over the 1985 average daily demand. Those figures are based upon 12 years of historical usage, adjusted for changes in projected population, employment and other factors. The projected peak-day demand in the year 2000 would be 141 mgd./138/ There are no plans for major upgrading of the city-wide water distribution system between now and the year 2000; the current system would be able to meet the projected demand, including Mission Bay./139/

As part of the state-required Urban Water Management Plan, the City has a water conservation program which includes public education and retrofitting of faulty appliances. The Water Department's goal is to reduce water consumption throughout the Hetch Hetchy System by 7.5% by 1997./140/

During years of low precipitation, the water available from San Francisco's Sierra Nevada reservoirs (Hetch Hetchy System) may be reduced. In such cases, the City may institute additional water conservation measures such as using the emergency water supply at Lake Merced for street cleaning, firefighting and irrigation; reducing electric power generation from the Hetch Hetchy System; asking residents to save water voluntarily by placing a special notice in water bills; and developing a conservation plan for the City's water customers on the Peninsula./141/

Mission Bay

Water demand factors used in calculating Mission Bay Project Area water demand were based upon billing records from similar San Francisco land uses and from industry standards. Table VI.D.22 shows total average daily water demand for each Mission Bay Alternative for 2000. Appendix D, Table XIV.D.35, p. XIV.D.38, presents detailed water demand calculations for each Alternative.

TABLE VI.D.22: MISSION BAY WATER DEMAND, BY ALTERNATIVE, 1985, 2000 AND 2020 (Millions of Gallons per Day)/a/

	1985	2000	1986-2000	2020	2001-2020
Alternative A	0.08	0.794	+0.714	1.895	+1.10
Alternative B	0.08	0.493	+0.413	1.563	+0.99
Alternative N	0.08	0.222	+0.142	0.588	+0.37

/a/ Martin H. Lieberman, Manager, City Distribution Division, San Francisco Water Department, letter, May 8, 1987. Letter shows monthly water consumption for selected San Francisco land uses, which were then applied as consumption factors for uses proposed for each Mission Bay Alternative. See Appendix D. Tables XIV.D.35 and XIV.D.36, pp. XIV.D.38 and XIV.D.39.

SOURCE: Environmental Science Associates, Inc.

SEWERS AND WASTEWATER TREATMENT

Sewage Generation

Table VI.D.23 presents estimated sanitary sewage generation for each Alternative for the years 2000 and 2020, it is assumed that 90% of the water used in the Project Area would be collected and treated as wastewater. (See Table VI.D.22, p. VI.D.101 for water demand calculations.) The remaining 10% typically would be used to irrigate landscaping, fight fires or similar needs./143/

TABLE VI.D.23: ESTIMATED PROJECT AREA SANITARY SEWAGE GENERATION, BY ALTERNATIVE, 1985, 2000 AND 2020 (Millions of Gallons per Day)/a/

	1985	2000	1986-2000	2020	2001-2020
Alternative A	.072	0.71	+0.6	1.71	+1.00
Alternative B	.072	0.44	+0.4	1.41	+0.97
Alternative N	.072	0.20	+0.1	0.53	+0.33

/a/ Sewage generation assumed to be 90% of water demand, as presented in Table VI.D.22, p. VI.D.101.

SOURCE: Environmental Science Associates, Inc.

2000

The San Francisco Clean Water Program does not forecast any appreciable change in dry-weather sewage flows between 1985 and 2000. Any increased flows due to new development would probably be offset by the City's water conservation efforts./144/ (See Water Supply, p. VI.D.101, for a description of the water conservation program.) During storm events, over 95% of any wastewater overflow would consist of stormwater runoff (see VI.L. Hydrology and Water Quality, p. VI.L.15).

Infrastructure

Some of the existing sewer line sizes in Mission Bay may be adequate to handle projected Mission Bay sewage under all Alternatives. Other pipes in the Project Area may be deteriorating (structurally inadequate), or may be too small (hydraulically inadequate). The City expects that some of the existing sewer lines in the Project Area except for the large box culverts at King, Berry, Channel and Third Streets would require replacement. Pipes requiring upgrading may be replaced or augmented by auxiliary parallel lines. Lines to serve new development would be laid with new street construction./145,146/

Treatment and Collection

For all Alternatives, the Clean Water Program does not expect any major increase in wastewater flow to the Southeast WPCP between 1985 and 2000, and no increase in Southeast WPCP treatment capacity is planned./147/ By the year 2000, Mission Bay wastewater flow would account for less than 0.8% of the total average dry weather flow expected at the Southeast WPCP. Clean Water Program staff stated that the increase in sewage generation from Mission Bay would have no substantial effect on the treatment capacity of the Southeast WPCP, nor on the collection capacity of the Division Street pump station and the Mariposa pump station. The increase would not measurably affect the Clean Water Program's ability to limit wet-weather channel overflows to eight or less per year./146/

Effluent Water Quality

S/LI/RD, M-2 Industrial and Port-related/M-2 uses would have to comply with the City's Industrial Waste Ordinance (Department of Public Works Order No. 104.497), which regulates the quality of water discharged into the sewer system in accordance with Regional Water Quality Control Board requirements. The ordinance sets limits on the following characteristics of industrial wastewater: pH (acidity/alkalinity), dissolved sulfides, temperature, grease/oil, chemical oxygen demand, radioactive materials, large objects, flammable substances, garbage, toxic substances, and heavy metals. In addition, Mission Bay uses would have to comply with General Pretreatment Regulations requiring the reduction, elimination or alteration of pollutant properties in wastewater. Industrial categories subject to those EPA regulations include electrical and electronic components manufacturing, chemicals manufacturing, pharmaceutical preparation, photographic equipment and supplies, plastic and synthetic materials manufacturing, printing and publishing, metal finishing, and other processes involving the use of metals./148/

The Clean Water Program must comply with effluent limitations for toxic pollutants set by the Regional Water Quality Control Board under the Basin Plan and conditions of the National Pollutant Discharge Elimination System permit issued for the Southeast WPCP. See VI.L Hydrology and Water Quality, p. VI.L.6 for discussion of China Basin Channel water quality and Basin Plan water quality objectives.

Alternative A

Mission Bay residents, employees and businesses would generate approximately 714,000 gallons of wastewater per day (gpd), an increase of 642,000 gpd for the Project Area in 1985. Mission Bay would represent approximately 0.8% of the total average dry weather flow treated by the Southeast WPCP. S/LI/RD or other industrial uses developed by 2000 would have to comply with industrial waste and pretreatment regulations. Not all S/LI/RD uses would generate such wastes.

Initial Phase of Development. Sewage treatment capacity would be adequate to serve the initial phase of development. Sewer lines may be replaced during street construction associated with that phase.

Alternative B

Mission Bay residents, employees and businesses would generate approximately 444,000 gpd of wastewater, an increase of about 372,000 gpd over 1985 sewage generation for the Project Area. Mission Bay would represent approximately 0.5% of the total average dry weather flow treated by the Southeast WPCP. Construction of the mid-channel wetlands would require the relocation of the existing 11-foot-by-11-foot box culvert along the south edge of the channel, as well as a portion of the 30-inch-by-40-inch Fourth Street sewer. In total, 2,000 linear feet of sewer would be demolished. Because all sewage from south of the channel drains to that sewer, it would have to be replaced in an "L" shape further to the south under Hooper Street. The new line would turn north at Owens Street and connect to the remaining portion of the original box culvert./145/ No new S/LI/RD uses which potentially could require wastewater pretreatment would be developed by 2000.

Initial Phase of Development. Sewage treatment capacity would be adequate to serve the initial phase of development. Sewer lines may be replaced during street construction associated with that phase.

Alternative N

By the year 2000, Mission Bay houseboat residents, employees and businesses would generate approximately 200,000 gpd of wastewater, an increase of about 128,000 gpd over 1985 sewage generation for the Project Area. Mission Bay would represent approximately 0.2% of the total average dry weather flow treated by the Southeast WPCP. M-2 Industrial and Port-related/M-2 facilities would have to comply with industrial waste and pretreatment regulations; not all of those uses would generate such wastes.

Build-Out/2020

Project Area sewage generation for 2020 is presented in Table VI.D.23, p. VI.D.104. The Clean Water Program does not expect any major increases in wastewater flow to the Southeast WPCP between 2000 and 2020./147/ Mission Bay would account for less than 2% of the plant's average dry-weather flow in the year 2020. As in the year 2000 case, the increase in sewage generation from Mission Bay in 2020 would not affect treatment or collection capacity. Any increase in flow would be accommodated by treatment capacity made available as mechanical components of the Southeast WPCP are gradually replaced and upgraded, and by reducing extraneous flows to the plant by replacing sewers that have infiltration problems in high groundwater and tidal areas./146/ Sewage lines serving new development would be installed as part of new street construction and would all be in place by 2020.

At build-out, additional industries would need to comply with the City's Industrial Waste Ordinance and pretreatment regulations, discussed on p. VI.D.105.

Alternative A

By the year 2020, Mission Bay residents, employees and businesses would generate approximately 1,710,000 gpd of wastewater, an increase of about 1,098,000 gpd over 1985 sewage generation for the Project Area. Mission Bay would represent approximately 2% of the total average dry-weather flow treated by the Southeast WPCP. This Alternative would have the largest amount of S/LI/RD and port-related uses that would have to comply with industrial waste and pretreatment regulations (about 3.6 million square feet) (although it is not likely that all S/LI/RD uses would generate industrial wastes requiring special treatment).

Alternative B

By the year 2020, Mission Bay residents, employees and businesses would generate approximately 1,410,000 gpd of wastewater, an increase of about 1,338,000 gpd over 1985 sewage generation for the Project Area. Mission Bay would represent approximately 1.7% of the total average dry-weather flow treated by the Southeast WPCP. No sewer lines would need to be removed to accommodate new wetlands. About 420,000 square feet of S/LI/RD space would have to comply with industrial waste and pretreatment regulations. As with Alternative A, not all S/LI/RD uses would generate such waste.

Alternative N

By the year 2020, Mission Bay residents, employees and businesses would generate approximately 529,000 gpd, an increase of about 457,000 gpd over 1985 sewage generation for the Project Area. Mission Bay would represent approximately 0.7% of the total average dry-weather flow treated by the Southeast WPCP. About six million square feet of M-2 industrial and port-related uses would need to comply with industrial waste and pretreatment regulations under this Alternative. Not all uses would generate industrial waste requiring such treatment.

SOLID WASTE DISPOSAL/148/

2000

In the year 2000, the solid waste generation for the Alternatives would range from approximately 12,000 tons/year to 27,000 tons/year (see Table VI.D.24). The 1985 level is about 1% of the City's total solid waste; projections for Mission Bay would range from less than 1% to 3% of San Francisco's total solid waste generation of about 910,000 to 920,000 tons per year in 2000./148/

The disposal companies would be able to collect solid waste from the Mission Bay Project Area in 2000. Additional staff and collection equipment would be required

TABLE VI.D.24: ESTIMATED PROJECT AREA ANNUAL SOLID WASTE GENERATION, BY ALTERNATIVE, 1985, 2000 AND 2020 (Thousands of Tons)

		Alternative A				Alternative B				Alternative N			
	1985	2000	1986-2000	2020	2001-2020	2000	1986-2000	2020	2001-2020	2000	1986-2000	2020	2001-2020
Mission Bay	7	27	+20	62	+35	22	+15	65	+33	12	+5	21	+9
San Francisco	688	918	+230	1,092	+174	916	+228	1,096	+180	910	+222	1,059	+149
Mission Bay Solid Waste as a Percent of Citywide Solid Waste	1%	3%		6%		2%		5%		1%		2%	

SOURCE: Environmental Science Associates, Inc., based on information provided by E. M. Rose and Associates. See Appendix D, Solid Waste Disposal and Table XIV.D.36, p. XIV.D.39, for calculation.

depending on the various types and amounts of solid waste generated by specific land uses within the Project Area. VI.N. Hazardous Wastes, p. VI.N.27-VI.N.32 discusses disposal of toxic or hazardous materials.

By 2000, San Francisco would have about five million tons of solid waste capacity remaining at the Altamont Landfill, out of the City's 15 million ton limit. Mission Bay solid waste generation would not substantially affect the useful life of San Francisco's capacity at the Altamont Landfill site.

Alternative A

The change in land uses from primarily transportation, wholesale/distribution and industrial to residential, office and S/LI/RD uses would result in a shift in the composition of waste materials. Industrial waste, including wood, crates, and metal, would shift to a greater proportion of paper and cardboard materials and household waste.

By the year 2000, Alternative A would generate about 27,000 tons per year of solid waste, about 3% of total projected solid waste generation in San Francisco and a 20,000-ton increase over 1985 Mission Bay solid waste generation.

Initial Phase of Development. In the initial phase of development, the Project Area would generate less than 1% of total 1985 solid waste in San Francisco.

Alternative B

In 2000, Alternative B would generate about 22,000 tons per year of solid waste, about 2% of total projected solid waste generation in San Francisco and a 15,000-ton increase over 1985 Mission Bay solid waste generation. Composition of waste would shift from transportation, warehouse and industrial waste to a higher proportion of household waste.

Initial Phase of Development. In the initial phase of development, the Project Area would generate less than 1% of 1985 total solid waste in San Francisco.

Alternative N

In 2000, Alternative N would generate about 12,000 tons per year of solid waste, about 1% of total projected solid waste generation in San Francisco and a 5,000-ton increase over 1985 Mission Bay solid waste generation. The waste stream would continue to be wood, crates and other industrial waste.

Build-Out/2020

The City's 15-million-ton allocation at the Altamont landfill is expected to be absorbed by 2009; no plans for disposal after this date have been completed, although the City expects that increased recycling of waste by 2009 would extend the useful life of the landfill. Mission Bay solid waste would represent part of the 1.1 million tons per year of solid waste for which the City would require a new disposal alternative sometime after 2009. As noted above, VI.N. Hazardous Wastes, p. VI.N.27-VI.N.32, discusses disposal of hazardous waste materials.

Alternative A

By 2020, Alternative A would generate about 62,000 tons per year of solid waste, about 6% of total projected solid waste generation in San Francisco and a 35,000-ton increase from 2000 Mission Bay solid waste generation, and 55,000 tons over 1985. The waste stream would be primarily office, household and light industrial waste.

Alternative B

Alternative B would generate about 65,000 tons per year of solid waste, about 5% of total projected solid waste generation in San Francisco and a 43,000-ton increase from 2000 Mission Bay solid waste generation, and 58,000 tons over 1985. The waste stream would be composed primarily of household waste.

Alternative N

Alternative N would generate about 21,100 tons per year of solid waste, about 2% of total projected solid waste generation in San Francisco and a 9,000-ton increase from 2000 Mission Bay solid waste generation, and 14,000 tons over 1985. The waste stream would continue to consist of industrial waste - wood, crates, metals.

STREETS

2000

Project Area Roadway Network and Sidewalks and Pedestrian Areas

The Project Area roadway network would consist of an hierarchy of streets including primary and secondary thoroughfares, neighborhood collector streets and mid-block lanes. Primary thoroughfares would provide access to the Project Area and routes for traffic through the Project Area. Secondary thoroughfares would supplement major thoroughfares and serve the office and industrial uses. Neighborhood collector streets and mid-block lanes would serve residential and retail areas, not through traffic. Trucks would use the primary and secondary thoroughfares and would be prohibited on other streets, except for deliveries. The circulation network would also include sidewalks and pedestrian routes in open space areas (see Recreation and Parks, p. VI.D.??). The Project Area street networks that would be developed by the year 2000 under each of Alternatives A, B and N are shown in Figures V.4, V.5 and V.6, pp. V.30, V.31, and V.32. Transportation features of the Alternatives are described in Table V.3, p. V.20.

Design and Maintenance/150/

With all Alternatives, Project Area streets would be designed and constructed according to Department of Public Works (DPW) standard specifications or approved new standards./151/ Primary and secondary thoroughfares would be designed to carry high levels of truck traffic; neighborhood collector streets and mid-block lanes would be designed to carry low levels of truck traffic. Streets would require rehabilitation (either resurfacing or full reconstruction) about every 18 years. More frequent rehabilitation would be needed if truck traffic levels were to exceed design load-bearing ability. DPW would provide normal street maintenance such as repairing potholes, patching cracks and resealing surfaces with a thin layer of asphalt. The Project Area is subject to subsidence and settlement due to the presence of Bay Mud (see VI.K. Geology and Seismicity, Areal Settlement and Foundation Types, p. VI.K.24-VI.K.29, and Differential Settlement, p. VI.K.29-VI.K.30). That settlement could have a detrimental effect on the integrity of streets and utilities constructed within the street areas. The design and construction of streets and appurtenant structures must take into account the potential settlement. Various methods such as surcharging and supporting building with piles can be used to reduce settlement (see VI.K. Geology and Seismicity, p. VI.K.45-VI.K.48). In addition to surcharge techniques, soil removal and the placement of extra structural base material may be required to stabilize the street areas. All stabilization techniques must be approved by DPW. All sidewalk areas are the maintenance responsibility of adjacent property owners; however, stabilization techniques used for sidewalk areas would have to be the same as those used for street areas to prevent differential settlement.

If all Project Area streets were designed to anticipate correctly the loads they would need to carry, they would have 18-year life spans and relatively the same maintenance requirements. Maintenance required for Project Area streets, therefore, would not differ by EIR Alternative. Because development of the Project Area under all Alternatives would generate increased use of the roadway network surrounding the Project Area, maintenance requirements for streets surrounding the Project Area would be expected to increase. Those requirements would differ by Alternative. Careful analysis of existing streets in these surrounding areas would be required to determine the need for street reconstruction in support of the Alternative chosen.

Ownership

New public street rights of way developed in the Project Area would be dedicated to the City under Alternatives A and B for ownership and maintenance by the City. After DPW determines that new streets have been constructed to City standards, the Board of Supervisors, by ordinance, would formally accept the streets for City maintenance. Under Alternative N, streets to serve internal industrial and commercial enterprises could be developed as private streets. Alternately, the landowner could apply to DPW for formal subdivision of the Project Area and develop and dedicate streets as part of a subdivision plan./152/

Alternative A

The Project Area street network that would be developed by the year 2000 under Alternative A is shown in Figure V.4, p. V.30. Due to traffic, especially truck traffic during construction generated by Alternative A, maintenance requirements for off-site streets would increase over existing requirements but not as much as under Alternative N, which would generate more truck traffic.

Alternative B

The Project Area street network that would be developed by the year 2000 is shown in Figure V.5, p. V.31. Maintenance requirements for off-site streets would increase due to traffic generated by Alternative B, but those requirements would increase less than under Alternatives A and N. That increase would be less because Alternative B is largely residential and would generate less truck traffic than would the other Alternatives.

Alternative N

The Project Area street network that would be developed by the year 2000 is shown in Figure V.6, p. V.32. Due to truck traffic generated by M-2 Industrial and Port-Related/M-2 uses with Alternative N, maintenance requirements for off-site streets would increase over existing requirements. Those requirements would be greater than under Alternatives A and B. Most truck traffic would use primary truck routes such as Mariposa, Third and Fourth Streets, to access the Bay bridge, and I-280 and U.S. 101. Maintenance needs would therefore focus on those primary truck routes.

Build-Out/2020

Development of the remainder of the Project Area street network between 2001-2020 in each Alternative would proceed in the same manner as that described for the year 2000 (see p. VI.D.112). The Project Area street network that would be developed at build-out/2020 under each of Alternatives A, B and N is shown in Figure V.1, V.2 and V.3, respectively, pp. V.12, V.14, and V.18. Maintenance requirements for off-site streets would continue to increase as the Project Area is built out, with Alternative N generating the most increase, followed by Alternative A, with the least effect by Alternative B, in order of decreasing amounts of industrial, S/LI/RD, and office uses. The increase of maintenance requirements for off-site streets as an effect of the Alternatives would be much more pronounced than by the year 2000 as truck traffic volumes increase.

MITIGATION

FIRE PROTECTION

Measure	Alternative	Description
D.1	A,B	Provide an engine company and appropriate fire department personnel when out-of-service time demands in the Project Area exceeds 80 hours. Provide an additional truck company and appropriate fire department personnel when out-of-service time in the Project Area exceeds 230 hours. This would provide the staff and equipment necessary to respond to Fire Department service calls generated in the Project Area without reducing service to surrounding areas.
D.2	A	Rehabilitate closed Station 30 or construct a new station adjacent to it to house both an engine and a truck company. That would reduce response time to the Project Area, Potrero Hill and Showplace Square. An estimated 30,000 square feet of building space with 15,000 square feet of additional site area would be required to house both companies./153/
D.3	B	Construct a new station in the Project Area to house an engine and a truck company. That would reduce response time to the Project Area, Potrero Hill, and Showplace Square.
D.4	A,B,N	To provide an adequate fire-fighting water supply throughout the Project Area, extend the Auxiliary Water Supply System (High-Pressure System) through the interior of the Project Area, roughly the area encompassed by China Basin Channel, Third, Fourth, Sixth and 16th Streets. The exact routing of the system would be determined by the San Francisco Fire Department and

Measure	Alternative	Description
		Department of Public Works. The extension would incorporate structural design measures for maximum resistance against earthquake damage.
D.5	A,B	Include eight water cisterns, each with a 75,000-gallon capacity, within the Project Area, phased with infrastructure development. The location of the cisterns and whether the water would be potable would be determined by the San Francisco Fire Department and Department of Public Works. The cisterns would provide local emergency water supply sources in the event water mains are ruptured during an earthquake.
D.6	A,B	To compensate for building in an "infirm" landfill area where the ground is susceptible to possible liquefaction and ruptured water mains during an earthquake, provide a fire station serving the Project Area with a "portable water system" consisting of nylon-neoprene hoses and portable bronze fire hydrants that can be deployed into interlocking grids linking water sources (e.g., working water mains, cisterns, or suction connectors leading to China Basin Channel or the Bay)./154/ This measure would increase the ability to extinguish fires in the aftermath of an earthquake.
D.7	A,B,N	See VI.K. Geology and Seismicity, pp. VI.K.52–VI.K.56, for mitigation measures to maintain emergency services and reduce damage to roadways and utilities during an earthquake.
POLICE PROTECTION		
D.8	A,B,N	Require building developers to meet with the San Francisco Police Department Crime Prevention Unit during the detailed design stage of the project to incorporate security

Measure	Alternative	Description
		concepts where feasible that could decrease the number of criminal incidents by increasing the visibility and security of doors and windows (i.e., decrease the amount of time in which a crime may be committed unobserved)./155/
D.9	A,B	Provide approximately 10,000 square feet of police facilities in the Project Area to accommodate increased police staffing needs, and an additional 1,000 square feet of space for a police/community conference room. Provide approximately 8,000 square feet for 40 parking spaces for staff and visitors. If a new facility is built to support an increased police force, the addition of commissioned officers (i.e., captain, lieutenant), janitorial and other station operations personnel would be required.
D.10	N	Provide approximately 2,000 square feet of police facilities in the Southern District to accommodate increased police staffing needs.
SCHOOLS		
D.11	A,B	In Alternative A, the project would generate about 600 public school students (grades K-12) by the year 2000 and 1,450 public school students by the year 2020. To address school space needs fully for Alternative A in 2020 would require one and one-half elementary schools, two-fifths of a middle school, and one-quarter of a high school. In Alternative B, the project would generate about 550 public school students by the year 2000 and about 1,900 by the year 2020. Alternative B would require two elementary schools, half of a middle school and one-third of a high school. If Mission Bay school space needs were met in the Project Area with typical size schools at all

Measure	Alternative	Description
		grade levels, those schools would have capacity to accommodate students from outside the Project Area. An elementary school in San Francisco generally requires two acres, a middle school three to four acres, a high school 10 to 20 acres, and a smaller alternative high school four acres. To plan for such a potential student population, reserve an appropriately sized public school site in the Project Area to help serve the space needs of Project Area public school students. A school developed in the Project Area would fully address the space requirements of the public elementary or middle or high school students living in the Project Area in the year 2000./156/
D.12	A,B	Reopen unused or leased schools, expand existing schools or develop new schools to serve Project Area and Nearby Area public school students not accommodated in a new school in the Project Area.
RECREATION AND PARKS		
D.13	A,B	Provide additional public parkland over that provided in Alternatives A and B to meet NRPA criteria for neighborhood and district open space in the Project Area. At build-out, about 29 more acres would be needed for Alternative A and about 11 acres for Alternative B. Those shortfalls do not include open space associated with other uses that would be available to Mission Bay residents and employees. They also do not account for other district open space available in San Francisco in the three-mile radius defined for that use. Allocating more land area for open space would require increasing building densities in other portions of the Project Area, or changing the land use program of Alternative A or B to reduce development.

Measure	Alternative	Description
D.14	B	Provide active open space areas under Alternative B by the year 2000 to serve recreational needs of Project Area residents. That could be accomplished by devoting to active sports a portion of the 16 acres of parkland to be developed under Alternative B by the year 2000. This would apply to the initial phase of development as well as to the year 2000 land use program.
D.15	A,B	Provide recreation centers for active recreation, such as gymnasium sports and recreational, cultural and community programs for all age groups.
D.16	N	Expand Agua Vista Park to extend into the Project Area to provide open space accessible to employees in the southern part of Mission Bay.
PUBLIC HEALTH		
D.17	A,B	Expand the South of Market Health Center to a new facility at the Seventh and Brannan Streets site, now under consideration for acquisition by DPH, to serve health care needs of Project Area and Nearby Area residents.
D.18	A,B,N	In the event of health danger following a sewage overflow, post signs prohibiting water contact.
WATER SUPPLY		
D.19	A,B,N	Include water conservation features in Mission Bay buildings and landscaping, where appropriate, such as: – water-conserving irrigation systems – low-water use landscape materials – limited turf areas in open space – ultra-low water use toilets and other water conserving appliances

Measure	Alternative	Description
		– cisterns to hold Mission Bay stormwater roof runoff for irrigation use in dry weather. That would reduce water consumption, as well as reduce stormwater runoff into the sewer system during wet weather. The cisterns would need to be protected from stagnation, contamination, and infestation by mosquitos./157/
D.20	A,B,N	Remove water mains from abandoned streets to clear the area for development, and loop unconnected "dead-end" runs to improve system efficiency./158/
D.21	A,B,N	To reduce disruption of streets for multiple excavation, install all sewer, water and other utility lines during street construction of each phase of the project./158/
SEWER		
D.22	B	Replace the existing 11-foot-by-11-foot box culvert along the south edge of the channel, as well as a portion of the 30-inch-by-40-inch Fourth Street sewer, with an "L" shape further to the south to accommodate the proposed wetland. Connect the new line, under Hooper and Owens Streets, to the remaining portion of the original box culvert./159/
SOLID WASTE		
D.23	A,B,N	To facilitate collection of recyclable solid wastes, provide all buildings readily accessible on-site collection and storage areas for recyclable materials such as paper, glass and metal.

NOTES

SETTING

Fire Protection

/1/ Information for this section generally was obtained from San Francisco Fire Department Annual Reports and interviews with Deputy Chief Gerald Cullen, San Francisco Fire Department.

/2/ Petty Officer Third Class Steven Sandoval, United States Coast Guard, Group San Francisco, telephone conversation, January 22, 1987.

/3/ The Fire Department's personnel are assigned to five programs: Suppression, Prevention, Investigation, Support Services, and Administration. The department's fire suppression forces are divided into three Administrative Divisions, Division 1 (Northeast Quadrant), Division 2 (West), and Division 3 (Southeast) which are further subdivided into ten Battalion Districts. Each Battalion District contains a number of stations to which various task units are assigned. These task units are engine companies, truck companies, rescue squads, and specialty units (e.g., fireboat company, service squad, searchlight unit, utility unit, and air compressor unit). There are 41 active stations in the City with 41 engine companies, 18 truck companies, two rescue squads, one fireboat company, and specialty units.

/4/ Engine companies are equipped with pumps, hoses, about 500 gallons of water, tools, and small ladders. Truck companies carry large ladders of about 100 feet in length, a larger variety of tools, such as the Hurst rescue tool (jaws of life), and additional personnel. All companies carry first aid equipment.

/5/ Engine and truck company numbers correspond to station numbers.

/6/ Station 8 on Bluxome Street is old, in poor condition and in an inconvenient location. The Fire Department hopes to close Station 8 and either renovate and reopen closed Station 30 at 1300 Fourth Street (at Third Street in the Mission Bay Project Area), or open a new station near or in the Project Area. Station 30, currently unoccupied, is in a superior location to meet Battalion 3 service area needs (e.g., improve response times). However, the existing building does not meet current earthquake standards. Deputy Chief Gerald Cullen, interview, August 21, 1986.

/7/ The locations and task units of the surrounding stations are:

Station 3	1067 Post	Engine Company, Truck Company
Station 13	530 Sansome	Engine Company, Truck Company
Station 25	3303 Third Street	Engine Company
Station 29	299 Vermont	Engine Company
Station 36	109 Oak	Engine Company
Station 37	798 Wisconsin	Engine Company

/8/ San Francisco Fire Department, Annual Report, 1985-1986.

/9/ Non-fire incidents include: rescue calls (resuscitations, first aid, person(s) trapped in elevators or autos, landslides, aircraft incidents and drownings); overpressure calls (ruptures of steam pipes, gas pipes or water heaters); hazard calls (gas/oil spillage, explosives removal, downed power lines, electrical short circuits, natural gas leaks, and building collapses); service calls (lock out/in, water removal, animal rescue, assist police, broken hydrants, sinking boats, broken sprinklers); and other miscellaneous incidents. See Appendix D. p. XIV.D.2 for statistics on incidents and response times.

/10/ Fireman James McDonagh, San Francisco Fire Department, telephone conversation, June 3, 1987.

/11/ Assistant Chief Oliver Storti, Management Services, San Francisco Fire Department, memorandum, February 4, 1987.

/12/ Response time refers to the interval between the time of the alarm and the time the first unit arrives on the scene. The response times are for the Battalion 3 District, and are average times that would vary depending on the time of day, traffic conditions, weather, and other factors affecting travel on the streets.

/13/ Wayne Till, Chief of the Bridge Section, U.S. Coast Guard, 12th District, telephone conversation, August 26, 1987.

/14/ An engine company usually responds to situations requiring medical aid, while a truck company responds to incidents requiring rescue tools (e.g., the "jaws of life"). The response of two truck companies is required to handle "jumping" (potential suicide) incidents. The standard initial response for a first alarm fire, whether located in a commercial, industrial or residential building, consists of three engine companies, two truck companies, one rescue squad, one Division Chief, one Battalion Chief and, if the alarm is close to the waterfront, one fireboat.

/15/ Normally, Engine Company 35 provides the staff for the fireboat. Engine Companies 13 and 26 usually serve as back-ups responding in place of Engine Company 35 to the incident scene.

/16/ The total personnel assigned to these units are:

Engine Company 1	One captain, three lieutenants, 11 firefighters
Engine Company 8	One captain, three lieutenants, 11 firefighters
Engine Company 35	One captain, three lieutenants, 14 firefighters
Truck Company 1	One captain, two lieutenants, 17 firefighters
Truck Company 8	One captain, two lieutenants, 14 firefighters
Rescue Squad 1	One captain, two lieutenants, 14 firefighters
Fireboat Company 1	One captain, three lieutenants, three pilots, four marine engineers

/17/ Time out-of-service is time during which a unit is responding to an incident and not available to respond to other incidents. When this occurs units located further away from the incident site must respond, lengthening the response time. "Out-of-service" does not mean the vehicle is broken down. Deputy Chief Gerald Cullen, San Francisco Fire Department, interview, August 21, 1986.

/18/ Deputy Chief Gerald Cullen, San Francisco Fire Department, interview, August 21, 1986.

/19/ Water mains in the Mission Bay Project Area are served by the 140-million-gallon capacity University Mound Reservoir located north of McLaren Park. The main distribution lines have a designed water pressure of 50 to 55 pounds per square inch and are cross connected to allow flow in either direction as a "grid" system. This design provides maximum reliability of the water supply for fire protection. For additional information on water supply, see Water Supply, p. VI.D.22.

/20/ The high-pressure line is capable of providing water pressure of 160 pounds per square inch within the Project Area, delivering 8,000 to 12,000 gallons per minute per block.

/21/ The Fire Department's fireboat Phoenix, as well as Coast Guard vessels, can and have entered the China Basin Channel beyond the drawbridges to fight fires, and can draw water from the channel. Rose Guerra, Assistant Chief of Bridge Section, U.S. Coast Guard, 12th District, telephone conversation, January 16, 1987.

/22/ Deputy Chief Gerald Cullen, San Francisco Fire Department, telephone conversation, January 17, 1987.

/23/ The bureau reviews plans for alterations or new construction, conducts all initial building inspections, carries out annual inspections of large industrial and high-rise buildings, issues notices of violations, and verifies compliance during follow-up inspections.

/24/ The Hazardous Material Response Team is made up of members of Engine Company 36 and is backed up by Rescue Squad 1 and Rescue Squad 2.

/25/ During FY 1985-1986, 160 fire incidents occurred citywide in industrial, manufacturing and storage locations; about 2,000 incidents occurred in residential locations.

Police Protection

/26/ The U.S. Coast Guard has criminal jurisdiction only over crimes that occur "at sea." Crimes that occur at the docked houseboats or the pier areas are outside of the Coast Guard's jurisdiction. Petty Officer Third Class Steve Sandoval, United States Coast Guard, Group San Francisco, telephone conversation, January 22, 1987.

/27/ Service at the Southern and Potrero District Stations is considered impaired due to their poor physical condition. Are We Prepared?: A Study of San Francisco Police Department Facilities, San Francisco Police Department, 1987.

/28/ The Police Department's crime statistics are organized by "plot" or "reporting area." Reporting areas vary in size, but cover about nine blocks. The portion of Mission Bay south of 16th Street, located in reporting area 303 of the Potrero District, is not used in generating crime statistics for Mission Bay for statistical reasons (this portion of the Mission Bay Project Area comprises less than one-half of reporting area 303 and inclusion of area 303 data would overstate the number of criminal incidents actually occurring in Mission Bay).

/29/ Office of the Police Commission, San Francisco Police Department, Stars in Action: Serving Our City, San Francisco Police Department Annual Report, Fiscal Year 1984-1985, July 9, 1985. Stars in Action: 1985-1986 had not been published as of July 1, 1987. Therefore, comparable data for FY 1985-1986 were not available.

/30/ Lieutenant Thomas W. Suttmeier, Commanding Officer, Planning Division, San Francisco Police Department, letter to Diane Oshima, Mission Bay EIR Coordinator, San Francisco Department of City Planning, August 29, 1986.

/31/ Part I incidents: murder, manslaughter, forcible rape, armed robbery, aggravated assault, burglary, larceny, auto theft. Part I crime reports usually are initiated by the victim. Part II incidents: non-aggravated assault, arson, forgery and counterfeiting, fraud and embezzlement, receiving stolen property, carrying weapons, sex offenses (except rape), narcotics, gambling, offenses against family and child, malicious mischief, violation of liquor laws, disorderly conduct, juvenile offenses, drunk driving, traffic violations, other miscellaneous crimes. Part II crime reports usually are initiated by the police.

/32/ The average District total was 12,700 incidents. The Southern District ranked fourth highest during FY 1984-1985, and the Potrero District ranked sixth. The three districts with the greatest number of crimes reported during FY 1984-1985 were the Central District, Northern District (the two Downtown districts) and the Mission District. (The average District total was 12,700 incidents. The Southern District ranked fourth highest during FY 1984-1985, and the Potrero District ranked sixth.) During FY 1984-1985, some 13,100 incidents were reported in the Southern District, about 11% of the total incidents in the City; and some 9,500 were reported in the Potrero District, about 8% of the total.

/33/ Reporting areas 286, 288, 290, 294, 295, and 297 are contained in or overlap portions of the Mission Bay project area north of 16th Street. Because the boundaries of these reporting areas and the Mission Bay project area north of 16th Street do not exactly coincide, the crime statistics cited for Mission Bay may overstate the actual number of incidents in Mission Bay itself.

/34/ San Francisco Police Department, "Incidents For Which a Police Report Was Made by District, Plot and Crime," January to December 1985.

/35/ Sergeant Thomas DelTorre, Crime Prevention Unit, San Francisco Police Department, personal interview, May 20, 1987.

/36/ Fireman James McDonagh, San Francisco Fire Department, telephone conversation, June 3, 1987.

/37/ Lieutenant Thomas W. Suttmeier, Commanding Officer, Planning Division, San Francisco Police Department, letter to Environmental Science Associates, Inc., "Calls for Service and Crime Data, Mission Bay Area," March 6, 1987.

/38/ Lieutenant Thomas W. Suttmeier, Commanding Officer, Planning Division, San Francisco Police Department, telephone conversation, January 20, 1987.

/39/ The Potrero District Station will be relocated about three miles south of Mission Bay at 1815 Egbert Street in the early 1990's. San Francisco Police Department $28,000,000 Bond Proposal, San Francisco Police Department, May 27, 1987.

Schools

/40/ San Francisco Unified School District, Student Attendance Department, "Active Enrollment, Spring 1986."

/41/ Lawrence Jacobson, Property Manager, San Francisco Unified School District, telephone conversations, June 5, 1987 and July 28, 1987.

/42/ San Francisco Unified School District, "Non-Public Ethnic Summary by Census Tract," computer print-out, October 28, 1985.

/43/ Enrollment figures for 1985-1986 are estimates based on 1986-1987 school year enrollment data from San Francisco Unified School District, "Summary of SFUSD Student Population by Census Tract," (computer print-out, October 15, 1986. That computer print-out shows the number of SFUSD students as of October 1, 1986 who lived in each area as defined by 1970 U.S. Census tracts. SFUSD collects the enrollment data by 1970 census tracts [instead of 1980 tracts] so that it will be consistent with historical data collected by 1970 tracts). The enrollment figures for these areas are approximate because census tracts, the areas for which enrollment data are collected, do not conform exactly to the boundaries of the Nearby Areas.

/44/ The conversion would not represent an increase in the district's high school capacity because the Academy's students are currently housed at a campus in the Sunset district. The district could consider adding one or two portable classrooms to the Bessie Carmichael Elementary School, at Harrison and Sherman Streets in South of Market, to help address the current need for more elementary classrom space in the adjacent Nearby Areas. Outside the adjacent Nearby Areas, SFUSD is considering reactivating three closed elementary schools in the Bay View - Hunters Point area (Dr. Charles R. Drew, Burnett and Jedediah Smith) to serve anticipated space needs in that area, not in the Nearby Areas adjacent to Mission Bay. Aside from Patrick Henry, Irving Scott Elementary, at 1060 Tennessee Street, is currently leased for a non-school use. The lease expires in 1991, but the district considers that reactivating it would not be cost-effective. It houses six classrooms and would require substantial rehabilitation to conform to current earthquake safety standards. Lawrence Jacobson, Property Manager, San Francisco Unified School District, telephone conversation, January 8, 1988.

Recreation and Parks

/45/ The inventory of existing park, open space and recreational land uses at the Project Area and vicinity was compiled from several sources: Deborah Learner, Planner, and Marilyn Duffey, Consultant, San Francisco Recreation and Park Department, interview, August 27, 1986; Deborah Learner, letter, August 27, 1986; "San Francisco Recreation and Park Department Facilities List," October 16, 1985; Recreation and Open Space Element of the San Francisco Master Plan; "San Francisco Bay Public Access and Recreation Areas," San Francisco Bay Conservation and Development Commission, June 1976; and ESA field survey, October 15, 1986.

/46/ Joan L. Lundstrom, Permit Analyst, San Francisco Bay Conservation and Development Commission, letter, October 21, 1986; and BCDC Permit No. 19-84, January 7, 1985.

/47/ The boat launch has no parking facilities; people park cars and trailers along China Basin Street after launching their vessels.

/48/ Thomas G. Conrad, Director of Plans and Programs San Francisco Redevelopment Agency, telephone conversation, October 9, 1986.

/49/ Enola Maxwell, Director, Potrero Hill Neighborhood House, telephone conversation, July 14, 1987.

/50/ San Francisco Department of City Planning, Recreation and Open Space Element, adopted by City Planning Commission Resolution 11065, July 9, 1987.

/51/ San Francisco Department of City Planning, Central Waterfront Plan, adopted by City Planning Commission Resolution 8631, July 3, 1980.

/52/ San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan, adopted January 1969, amended July 1979.

/53/ San Francisco Bay Conservation and Development Commission, San Francisco Waterfront Special Area Plan, adopted April 1975, as amended.

Libraries

/54/ These libraries range in size from approximately 5,500 square feet for the Potrero and Business Branches to approximately 177,000 gross square feet for the Main Library. Annual users range from 26,800 at the Potrero Branch to 166,600 at the Business Branch to 985,700 at the Main Library. The present user capacity varies from 50 at Potrero to 95 at the Business Branch to 480 at the Main Library. The number of employees at the three libraries include four at Potrero, 13 at the Business Branch and 162 at the Main Library. San Francisco Public Library, Information for Mission Bay EIR, memorandum to John Frantz, City Librarian from Karen Scannell, Chief of Branches, September 17, 1986.

/55/ John Frantz, Librarian, and Karen Scannell, Chief of Branches, interview, September 23, 1986.

/56/ Becker and Hayes, Inc., and Omni-Group, Inc., "Functional and Space Requirements for a New San Francisco Main Public Library Building on Marshall Square," September 30, 1986.

Public Health Services

/57/ City and County of San Francisco, "County Health Services Plan Update and Budget for Fiscal Year 1985-1986," September 13, 1985, San Francisco, California. Unless otherwise noted, all of the information regarding DPH services was taken from this report.

/58/ Donna D'Acuti, Coordinator, San Francisco Department of Public Health, Emergency Medical Services Agency, interview, December 3, 1986, and telephone conversation, January 15, 1987.

/59/ Total annual Code 3 calls for Zone 6 are based on data collected during October 1986, "October 1986 EMS Response Time Analysis," San Francisco Department of Public Health, December 8, 1986.

/60/ James T. Gilday, Health Program Planner, San Francisco Department of Public Health, interviews, February 27 and September 17, 1986, and telephone conversation, October 20, 1986.

/61/ Teresa Serata, Health Program Planner, San Francisco Department of Public Health, interview, September 17, 1986 and telephone conversation, October 20, 1986.

/62/ City and County of San Francisco, Legislative Digest, "Hazardous Materials Permit and Disclosure Ordinance," October 7, 1986.

/63/ San Francisco Department of Public Health, Division of Mental Health Programs, 1987–1988 Action Plan, November 1986.

/64/ San Francisco Department of Public Health, Community Substance Abuse Services, Division of Drug Programs, "Drug Program Plan and Budget 1985–1986," 1985

/65/ San Francisco Department of Public Health, Community Substance Abuse Services, Division of Alcohol Programs, "1984–1985 Update, San Francisco County Alcohol Program Plan and Budget," September 1984.

Water Supply

/66/ Most of San Francisco's water supply originates in the Tuolumne River watershed of the Sierra Nevada mountains. The water is impounded in the Hetch Hetchy Reservoir and delivered to the Bay Area through a 150-mile-long system of pipelines and tunnels. Of the 400 million gallons per day (mgd) taken from Hetch Hetchy, only 300 mgd can be delivered to the Bay Area due to limited pipeline capacity. The remaining 100 mgd is discharged into Don Pedro Reservoir in Tuolumne County. San Francisco Public Utilities Commission, "San Francisco Water and Power," January 1985.

/67/ Water from the Sierra Nevada and local watersheds is stored on the San Francisco Peninsula in the Crystal Springs Reservoir and San Andreas Reservoir. The storage capacity of the peninsula reservoirs is approximately 28.8 billion gallons (James D. Cooney, General Manager and Chief Engineer, San Francisco Water Department, letter to Diane Oshima, Mission Bay EIR Coordinator, Department of City Planning, August 19, 1986).

/68/ James D. Cooney, General Manager and Chief Engineer, San Francisco Water Department, letter to Diane Oshima, Mission Bay EIR Coordinator, Department of City Planning, August 19, 1986.

/69/ Martin H. Lieberman, Manager, City Distribution Division, San Francisco Water Department, letter, November 3, 1986.

/70/ Martin H. Lieberman, Manager, City Distribution Division, San Francisco Water Department, interview, October 16, 1986.

/71/ Factors used to calculate current water demand were derived from water billing records of similar San Francisco land uses. The following factors were applied:

Use	Factor (gpd)
Transportation & Related Services	.014/sq. ft.
Wholesale/Distribution/Warehouse	.010/sq. ft.
Vehicle/Equipment Storage	.010/sq. ft.
Manufacturing/Construction	.126/sq. ft.
Office	.057/sq. ft.
Retail/Restaurant	.299/sq. ft.
Arts/Design	.126/sq. ft.
Other*	1,000 gpd

* Primarily estimated RV Park use.

/72/ KCA Engineers, Inc., "Mission Bay Site Investigation," San Francisco, California, February 1983.

/73/ Thomas Dickerman, Chief Division Engineer, City Distribution Division, San Francisco Water Department, telephone conversation, November 14, 1986.

Sewers and Wastewater Treatment

/74/ Daniel M. Champeau, Project Manager, San Francisco Clean Water Program, interview, June 24, 1987.

/75/ J.M. Dela Cruz, Civil Engineer, Division Chief, San Francisco Clean Water Program, telephone conversations, September 25, 1986 and October 27, 1986.

/76/ San Francisco Clean Water Program, "1985-1986 Wet-Weather Operation Summary Table," and "1986-1987 Bayside Wet Weather Annual Summary," San Francisco, California.

/77/ The Westside System, completed in February 1987, consists of the 2.5-mile-long Westside Transport Storage box sewer; the Westside Pump Station; and the 4.5-mile-long Southwest Ocean Outfall. All dry-weather flows receive primary treatment at the Richmond-Sunset WPCP and then are sent through a gravity pipeline within the Westside Transport to the Southwest Ocean Outfall. During wet weather, most of the combined sanitary and storm wastewater flows in excess of Richmond-Sunset plant capacity are stored in the Westside Transport for the duration of the storm, pumped to the Richmond-Sunset plant through the West Side Pump Station and a force main within the transport, then treated at the plant and discharged through the Southwest Ocean Outfall. The storage box consists of two channels. At a predetermined level, flows empty through a baffle into the westerly channel, retaining heavy and floatable material in the east channel. The decanted flow is pumped directly to the outfall. Other proposed Clean Water Program projects include the Crosstown Transport (a tunnel or surface main to discharge Southeast WPCP effluent to the Ocean instead of the Bay), the new Southwest Water Pollution Control Plant and Mariposa pump station improvements. The Southwest plant would treat Westside dry-weather and wet-weather flows; the plant may be operational by the year 2000. The Mariposa pump station and related infrastructure improvements will reduce overflows at the Mariposa Street outfall to less than ten a year.

/78/ Frank M. Covington, Director, Water Management Division, United States Environmental Protection Agency, letter to San Francisco Clean Water Program, June 12, 1986.

/79/ David Jones, Planning and Control Division, San Francisco Clean Water Program, interview, September 25, 1986.

/80/ Sewage generation was calculated as 90% of water demand. For water demand factors, refer to Water Supply, p. VI.D.101.

/81/ San Francisco Department of City Planning, Sewage Overflow Options, Mission Bay, prepared by KCA Engineers, Inc., September 1986.

Solid Waste Disposal

/82/ Amy Perlmutter, Recycling Coordinator, Office of the Chief Administrative Officer, letter to Diane Oshima, Mission Bay EIR Coordinator, Department of City Planning, September 23, 1986.

/83/ Based on a Waste Composition Study Chart, provided by Amy Perlmutter, Recycling Coordinator, Office of the Chief Administrative Officer, meeting, September 22, 1986.

/84/ San Francisco Department of City Planning, Solid Waste Sludge Transportation, Negative Declaration, 86.359E, July 25, 1986.

/85/ Louis F. Pitto, General Manager, Assistant to the President, Sunset Scavenger Company, letter to Diane Oshima, Mission Bay EIR Coordinator, Department of City Planning, November 4, 1986.

/86/ Fiore Garbarino, Treasurer, Golden Gate Disposal Company, letter to Diane Oshima, Mission Bay EIR Coordinator, Department of City Planning, November 18, 1986.

/87/ Class I waste is a substance that is corrosive, ignitable, reactive, or toxic. Class II waste could release substances into water in excess of applicable water standards, but is not considered as hazardous as Class I waste. Class III waste is non-hazardous waste.

Streets

/88/ Tim A. Molinare, Division Engineer, and Gordon M. Wong, Division Engineer, Division of Streets and Highways, Bureau of Engineering, San Francisco Department of Public Works, interview, October 17, 1986; and Tim A. Molinare, telephone conversation, November 13, 1986.

/89/ Tim A. Molinare, Division Engineer, Streets and Mapping Division, Bureau of Engineering, San Francisco Department of Public Works, letter, December 9, 1986.

/90/ Cliff Jarrard, Administrative Engineer, Port of San Francisco, memorandum to Vello Kisk, Chief Harbor Engineer, Port of San Francisco, January 23, 1987.

/91/ The "official grade" of a street is recommended by the San Francisco Department of Public Works and established by ordinance of the Board of Supervisors.

/92/ Robert M. Lavell, Senior Right-of-Way Agent, and Wallace Wortman, Director of Property, San Francisco Real Estate Department, interview, January 22, 1986; and Matthew D. Ashe, Acting Assistant Director of Property, San Francisco Real Estate Department, telephone conversation, November 13, 1986.

/93/ If an adjoining owner were to propose purchase of City-owned former streets that were vacated by the City, but where title was never conveyed to the private party, the conveyance would still require approval by the Board of Supervisors unless the original ordinance specified such a sale. In this case also the Real Estate Department would appraise the property, and the private party would compensate the City at its fair market value.

IMPACT

Fire Protection

/94/ Appendix D. Community Services and Infrastructure, p. XIV.D.4 describes in detail the methodology used to estimate future fire/non-fire incidents and additional personnel required to maintain the current level of fire service within Battalion 3.

/95/ Out-of-service time is the amount of time during which an engine or truck company is responding to fire/non-fire incidents and is not available to respond to other incidents. Out-of-service does not mean the vehicle is broken down.

/96/ Deputy Chief Gerald Cullen, San Francisco Fire Department, interview, May 11, 1987.

/97/ Primary responsibility for evacuation lies with the Police Department. The Fire Department provides assistance when fire personnel are available and police personnel are not. No special equipment is required. Assistant Chief Howard Slater, San Francisco Fire Department, telephone conversation, January 6, 1988.

/98/ William Barton, President, KCA Engineers, telephone conversation, June 3, 1987.

Police Protection

/99/ The fact that types of crime, attitudes toward crime, and police technology will be subject to change in the future reduces the reliability of any methodology for predictive purposes, but not for the comparative purposes under consideration.

/100/ "Reported police incidents" records contain the street address associated with each incident. The number and types of incidents can therefore be associated with different land uses.

/101/ Basic Recruit Training takes 750 hours and costs approximately $28,600. A police vehicle (four-door sedan) with added police equipment costs approximately $23,600. Uniforms and equipment for one officer cost approximately $4,200. Memorandum, San Francisco Police Department, "Cost to Field One Police Officer", Officer Heather J. Fong to Lieutenant Thomas W. Suttmeier, May 13, 1987.

/102/ The patrol function is performed by the police officers of the Field Operations Bureau out of district stations. They are referred to as patrol officers in this report. The investigative functions are performed by the police officers, inspectors and assistant inspectors of the Investigative Bureau, referred to here as investigative officers. Traffic functions, including parking control, are performed by the police officers and civilians of the Traffic Division, referred to here as traffic officers. The support services are performed by the police officers and civilians of the Operations Center, Technical Services Bureau and Administration Bureau, referred to here as support personnel. This division has been used by Gruen Gruen + Associates, 1981, Fiscal Impacts of New Downtown High-Rises on the City and County of San Francisco, and San Francisco Department of City Planning, 1984, The Downtown Plan Environmental Impact Report, EE 81.3, certified October 18, 1984.

/103/ Sergeant Tom Del Torre, Crime Prevention Unit, San Francisco Police Department, interview, May 20, 1987.

/104/ Lieutenant Thomas Suttmeier, Commanding Officer, Planning Division, San Francisco Police Department, interview, February 23, 1988.

/105/ Steve Lutes, Planning Division, San Francisco Police Department, interview, February 23, 1988. Expected rates of criminal activity would reflect the ratios of outside population passing through Mission Bay to resident population. The 2 p.m. to 10 p.m. period for peak criminal activity is based on current crime incident statistics.

/106/ Are We Prepared?: A Study of San Francisco Police Department Facilities, San Francisco Police Department, 1987; San Francisco Police Department $28,000,000 Bond Proposal, San Francisco Police Department, May 27, 1987.

/107/ Memorandum, San Francisco Police Department, "Southern Station -- the Need for a New One", Harold E. Waterman, Senior Management Assistant, to Lieutenant Thomas Murphy, November 24, 1987.

/108/ Routine response by a patrol unit is not affected by the distance between the incident and police facility. However, responses requiring additional units from the facility would be affected by distance.

/109/ Space requirements are based on 120 square feet of interior building space per person, counting personnel from all watches. This does not include parking space or community meeting space.

/110/ Lieutenant Thomas Suttmeier, Commanding Officer, Planning Division, San Francisco Police Department, interview, May 11, 1987.

Schools

/111/ State of California Department of Finance, Population Research Unit, "Projection Summary: K-12 Public School Enrollment, Total Graded Enrollment by County, by School Year," July 9, 1986 and Projected Age Distribution of San Francisco Total Population, Years 2000 and 2020, "WKSP Form 4," April 1987.

/112/ Factors contributing to the district's enrollment growth are discussed in San Francisco Unified School District's Staff Report, "Demographic Analysis and Facilities Needs 1985-1995," March 25, 1985.

/113/ Between the present and the year 2000, and over the approximately 30-year build-out period of Mission Bay, classroom space needs would be expected to rise in some neighborhoods and fall in others. SFUSD could take several actions to respond to fluctuations in classroom space needs citywide (see footnote /5/ in Setting) and in the adjacent Nearby Areas (see p. VI.D.50). Thus, like enrollment levels, available classroom capacity could change over time. To provide the most useful capacity benchmark with which to assess Mission Bay school impacts, the estimated citywide space shortfalls, as well as the future school space needs estimated throughout this section, were calculated using the 1985-1986 capacity conditions (see Appendix D, Table XIV.D.5, p. XIV.D.5).

/114/ Of the 63,387 SFUSD students enrolled in 1985-1986, 45.6% (28,880) were elementary, 21.2% (13,429) were middle and 33.2% (21,078) were high school students. The grade distribution is expected to change over time. Based on California Department of Finance estimates of the future age distribution of the San Francisco population, in the year 2000, 40% of SFUSD students would be elementary, 23% would be middle and 37% would be high school students. In the year 2020, the distribution would be 47% elementary, 22% middle and 31% high school students. (State of California, Department of Finance, Population Research Unit, Projected Age Distribution of San Francisco Total Population, Years 2000 and 2020, "WKSP Form 4," April 1987.)

/115/ The Nearby Areas adjacent to the Project Area are further defined in Appendix D. Table XIV.D.24, p. XIV.D.27.

/116/ Estimates of SFUSD enrollment in adjacent Nearby Areas are based on forecasts by Recht Hausrath & Associates and the Association of Bay Area Governments (ABAG) of total population by census tract. Those estimates assume that the proportion of public school students relative to total population, in each census tract, would be the same in the years 2000 and 2020 as the existing proportion. (The existing proportions for each tract were derived from comparing total population with SFUSD enrollment, as contained in "Summary of SFUSD Student Population by 1970 Census Tract," [computer print-out], October 15, 1986.

/117/ Estimates of Project Area school-aged children in the year 2000 are presented in Appendix D. Table XIV.D.25, p. XIV.D.28-XIV.D.29.

/118/ Of students who live in San Francisco, about 72% of those in grades kindergarten through eight, and 78% of those in grades 9-12, attend public school. (San Francisco Unified School District, Non-Public Ethnic Summary by Census Tract," computer print-out, October 28, 1985.)

/119/ Differences among the Alternatives in citywide enrollment growth indicate the magnitude of the net addition to citywide enrollment of one Alternative compared to another. Development of Mission Bay under Alternatives A and B would result in about 300, or 4%, more public school students than otherwise would occur citywide under Alternative N. The differences in citywide enrollment among Alternatives are less than the differences in enrollment in the Project Area because a portion of what is counted as population (and enrollment) growth in the Project Area under one Alternative would occur elsewhere in the City under another Alternative.

/120/ Lawrence Jacobson, Property Manager, San Francisco Unified School District, interview, May 22, 1987.

/121/ Background estimates of Project Area school-aged children in the year 2020 are presented in Appendix D. Table XIV.D.26, p. XIV.D.30.

/122/ Differences among the Alternatives in citywide enrollment growth reflect the net enrollment addition of one Alternative compared to another. Development of Mission Bay under Alternative A would result in about 1,100 (11%) more public school students citywide than otherwise would occur under Alternative N. Alternative B would result in about 1,600 (15.7%) more public school students citywide than would Alternative N. The differences among Alternatives in citywide enrollment are less than the differences in enrollment in the Project Area (see Project Area Public School Students . . . , p. VI.D.56) because a portion of what is counted as population (and enrollment) growth in the Project Area under one Alternative would occur elsewhere in the City under another Alternative.

Recreation and Parks

/123/ Whether the City or a private entity maintains Mission Bay open spaces, the Recreation and Park Department and Planning Department would have to review the park program and open space design details before approving construction.

/124/ Personnel estimates assume that open space areas and recreation buildings are staffed seven days a week. Estimates of gardener/landscape maintenance workers were developed using an employment density factor of one gardener/landscape maintenance worker per 2.14 acres of passive and active parkland. That factor and custodian staffing estimates were based on staffing levels for comparable facilities reported in Ron de Leon, Assistant Supervisor of Neighborhood Parks, San Francisco Recreation and Park Department, "Mission Bay Staffing Criteria," memorandum, October 9, 1987 and at an interview with Marilyn Duffey, October 22, 1987. Recreation director estimates are based on staffing levels at comparable facilities provided by Ron de Leon, telephone conversation, May 29, 1987.

/125/ Robert D. Buechner (Ed.). National Park, Recreation and Open Space Standards, National Recreation and Park Association, 1971, as cited in Seymour M. Gold, Recreation Planning and Design, McGraw-Hill, Inc., 1980. Chapter 11 of Recreation Planning and Design, "Recreation Standards," discusses the limitations of standards. Using a standard to estimate open space demand has several shortcomings: it addresses quantity, but not type and quality of open space; reflects current leisure needs and preferences and doesn't account for socioeconomic changes in a community over time; and may or may not be realistic in light of a community's ability to implement it. Nevertheless, a standard can be applied to illustrate relative demand among alternative development scenarios.

/126/ San Francisco Department of City Planning, "Open Space Standards per Residential Populations," April 1988.

/127/ San Francisco Department of City Planning, Recreation and Open Space Element, adopted by City Planning Commission Resolution 11065, July 9, 1987, Figure 3, "Service Areas" p. 48. In addition, Map 9, "Neighborhood Recreation and Open Space Improvement Priority Plan," p. 50, identifies portions of the South of Market and Inner Mission as high open space need areas.

/128/ San Francisco Department of City Planning, South of Market Plan: Proposal for Citizen Review, June 1985.

Libraries

/129/ San Francisco Public Library, Information for Mission Bay EIR, memorandum to John Frantz, City Librarian, from Karen Scannell, Chief of Branches, September 17, 1986.

/130/ The population totals for Rincon Point-South Beach, South of Market and Potrero Hill are based on projections by census tract prepared by the Association of Bay Area Governments (ABAG) and forecasts prepared by Recht Hausrath & Associates for this EIR.

/131/ Karen Scannell, Chief of Branches, San Francisco Public Library, telephone conversation, December 14, 1987.

Public Health Services

/132/ Teresa Serata, Health Program Planner, San Francisco Department of Public Health, telephone conversation, July 30, 1987.

/133/ Aubrey Lewis, Senior Rodent Control Inspector, San Francisco Department of Public Health, telephone conversation, September 14, 1987.

/134/ Charles B. Darke, Dental Director, San Francisco General Hospital, letter to James Gilday, August 12, 1987. DPH has investigated expanding the SMHC to a new building at Seventh and Brannan Streets. The new site would provide 16,000 square feet, an increase of 9,500 square feet over the present facility. The location of the new site would lend itself to effective coverage of the Mission Bay community; however, it may not meet the demand generated by Mission Bay residents. It is difficult to estimate the number of Mission Bay residents who would seek health care from private physicians rather than using DPH services. However, to illustrate the potential for further overcrowding of the SMHC, DPH has provided the following figures: If one-half of the 18,667 residents under Alternative B at 2020 sought care at the SMHC, at least 20 additional full-time physicians would be needed, with a commensurate addition of nursing, pharmacy and other support staff. An additional 10 to 15 dentists would be needed.

/135/ Steven LaPlante, Special Coordinator for the Homeless, Mayor's Office, telephone conversation, June 3, 1987 and interview, September 8, 1987. Although San Francisco Police Department reports account for some homeless people in the area, these counts are not reliable as they do not include surveys of people in unattended vacant structures.

/136/ William McConnell, Director of Planning and Evaluation, Community Mental Health Services, San Francisco Department of Public Health, letter to James Gilday, May 22, 1987. Mental Health Needs Assessment Based on April 1, 1980 Census Data. California Department of Mental Health, Statistics and Data Retrieval Section, May 17, 1983.

Water Supply

/137/ San Francisco Water Department chart, "Average Annual Historical Water Use and Normal Forecast of Future Demand," undated, San Francisco, California. The Water Department's forecasts are based upon ABAG Projections '85, which considers Mission Bay population growth.

/138/ Martin H. Lieberman, Manager, City Distribution Division, San Francisco Water Department, letter, November 3, 1986.

/139/ Thomas Dickerman, Chief Division Engineer, City Distribution Division, San Francisco Water Department, telephone conversation, July 24, 1987.

/140/ Robert Vasconcellos, Resources and Planning Manager, San Francisco Water Department, telephone conversation, February 25, 1988.

/141/ "S.F. to Begin Conserving Water," San Francisco Examiner, March 25, 1987.

/142/ James D. Cooney, General Manager and Chief Engineer, San Francisco Water Department, letter, August 19, 1986.

Sewers and Wastewater Treatment

/143/ Gordon, Fair, John Geyer and Daniel Okun, Water and Wastewater Engineering, John Wiley and Sons, New York, 1966. p. 5-21. The Clean Water Program concurred with the assumption in that source that sewage flows would be 90% of water demand.

/144/ David Jones, Planning and Control Division, San Francisco Clean Water Program, interview, September 25, 1986.

/145/ William Barton, President, KCA Engineers, Inc., telephone conversations, July 24, and August 10, 1987

/146/ Daniel Champeau, Project Manager, San Francisco Clean Water Program, telephone conversations, October 14, 1987 and February 25, 1988, and letter, October 14, 1987.

/147/ Don Munakata, Project Manager, Project Management Division, San Francisco Clean Water Program, telephone conversation, July 21, 1987.

/148/ 40 Code of Federal Regulations, Parts 125 and 403, EPA's pretreatment regulations are enforced by the Clean Water Program as part of the locally-run pretreatment program.

Solid Waste Disposal

/149/ Appendix D, Solid Waste, p. XIV.D.41, describes the methodology and calculations for Mission Bay solid waste generation estimates. The estimates are based on solid waste projections for San Francisco prepared by Bechtel Power Corporation, and are primarily a function of annual per-resident and per-employee generation factors, adjusted for existing solid waste generation in Mission Bay.

Streets

/150/ Tim A. Molinare, Division Engineer, Streets and Mapping Division, Bureau of Engineering, Department of Public Works, telephone conversation, August 27, 1987.

/151/ Department of Public Work's Division of Streets and Highways would review project plans to assess that the physical design of proposed streets would meet City standards for layout, width, number of lanes, load bearings, pavement, base, subbase, curbs, drainage, grading and rail tracks. The Surveys and Mapping Division would review proposed streets for horizontal and vertical standards and the Traffic Division would review proposed network design, street capacities, signals, lighting and lane demarkation.

/152/ Matthew D. Ashe, Assistant Director of Property, San Francisco Real Estate Department, telephone conversation, October 21, 1987.

MITIGATION

/153/ Assistant Chief Howard Slater, San Francisco Fire Department, telephone conversation, October 19, 1987.

/154/ As part of emergency water supply improvements funded by Proposition A passed in 1987, six suction connectors will be installed about every 2,000 feet along China Basin Channel and the Bay waterfront. No additional connectors will be required for Mission Bay development. Assistant Chief Blackburn, San Francisco Fire Department, telephone conversation, June 13, 1988.

/155/ Specific design features for building security need to be determined on a site-by-site basis; the following general design guidelines could be considered:

- landscape streets and parks to allow surveillance from patrol cars;
- design alleys and cul-de-sacs to be entirely visible from main roads;
- provide street lighting which does not shine into the eyes of patrolling police;
- incorporate surveillance opportunities into buildings (e.g., kitchen windows overlooking entry areas in residential units);
- use fencing, lighting and private security guards at construction sites;
- install high quality locks and reinforced windows on ground floors;
- provide electronic access cards for all commercial buildings; and
- provide security guards for commercial buildings.

/156/ Development of re-opened or new school buildings to serve Mission Bay students would be supported by the School Facilities Fee, levied on new development on a per-square-foot basis. The fee, authorized by state legislation, was implemented by the San Francisco Unified School District effective June 1, 1987. The fee would offset, but not completely cover, the costs of new or re-opened schools in or near Mission Bay.

/157/ Thomas Dickerman, Chief Division Engineer, San Francisco Water Department, telephone conversation, August 29, 1987.

/158/ William Barton, President, KCA Engineers, Inc., telephone conversations, July 24, and August 10, 1987.

/159/ Daniel Champeau, Project Manager, Project Management Division, San Francisco Clean Water Program, telephone conversation, July 28, 1987.

E. TRANSPORTATION

SETTING

This section presents 1) the descriptions of transportation facilities and services within and adjacent to the Mission Bay Project Area; 2) the description of regional transportation facilities serving San Francisco; and 3) a discussion of the most significant plans, policies and programs affecting the provision of transportation in or to the Project Area. The descriptions of usage and operating conditions for each type of transportation facility or service in or near the Project Area are based on counts or other data collected in 1985. This section also contains updates since 1985 of characteristics or factors of transportation facilities or usage, when they would notably change the base against which the impacts are analyzed.

EXISTING PROJECT AREA TRANSPORTATION FACILITIES AND SERVICES

The Project Area, approximately one mile south of the financial district of San Francisco, is served directly by a variety of transportation modes. Additional transportation facilities and services exist nearby in downtown San Francisco. The Project Area contains the San Francisco terminals of two major regional transportation facilities and services -- the I-280 Freeway and CalTrain (Peninsula Rail Service). Also found in the Project Area are rail switching tracks and sidings owned and operated by the Southern Pacific Transportation Company (SP), and the Atchison, Topeka and Santa Fe Railway Company (ATSF). Within or adjacent to the eastern boundaries of the Project Area, are piers and related maritime facilities owned privately or by the Port of San Francisco.

Highway, transit, rail (freight), maritime, pedestrian, and bicycle facilities directly serving or near the Project Area are discussed in the following paragraphs. Descriptions of existing project-level facilities and services are followed by descriptions of major regional transportation facilities in the Project Area and Downtown San Francisco./1/

Nearby Regional Transportation Systems

Regional access to and from the Project Area is provided by: I-280; arterial streets leading to I-80, I-280 and U.S. 101; CalTrain (Peninsula Rail Service); and San Francisco

Municipal Railway (MUNI) buses connecting to major regional transit terminals in downtown San Francisco. Figure VI.E.1 shows the major regional highway and transit facilities within and near Mission Bay.

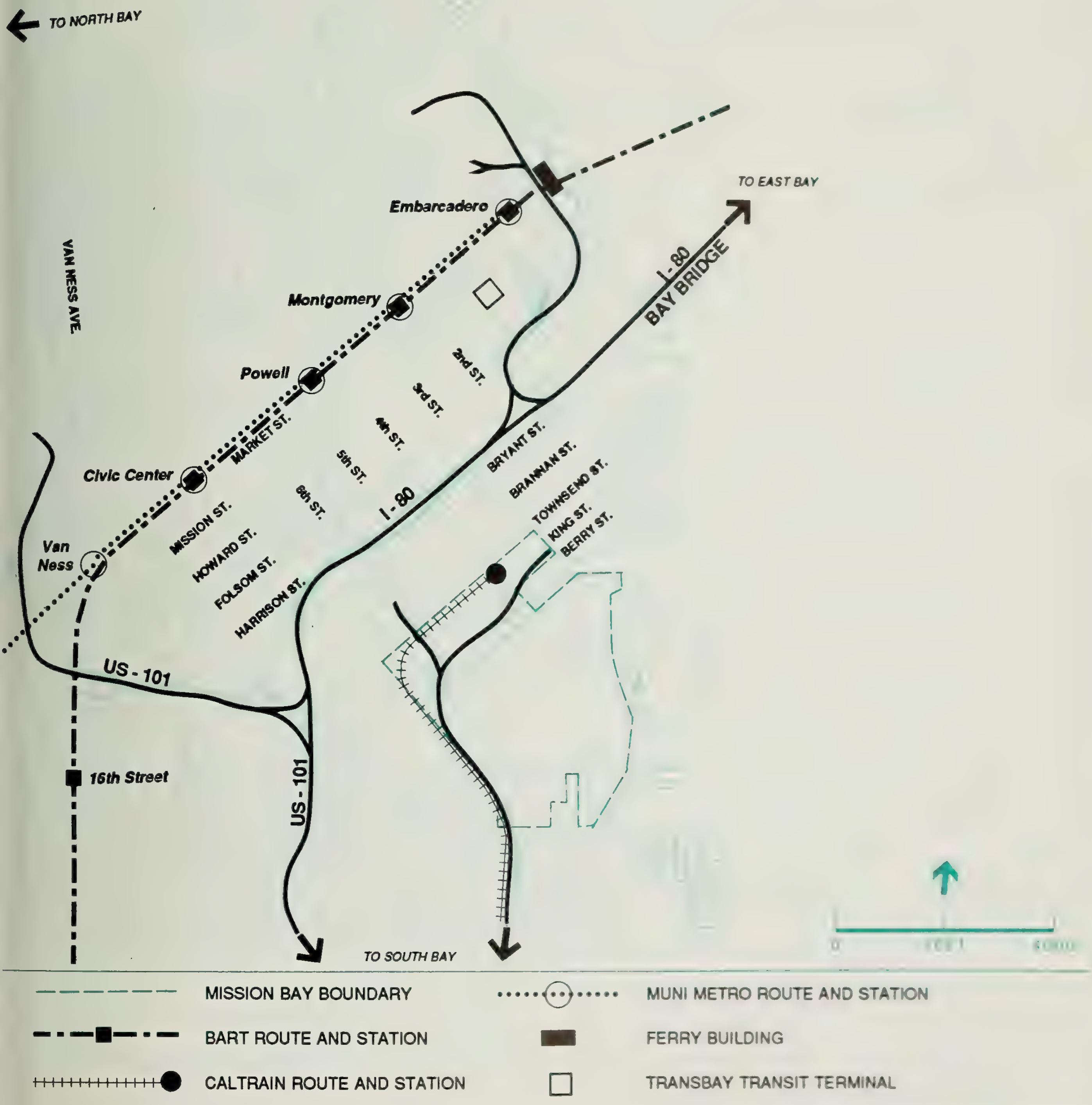
Surface streets and freeways connect the Project Area to all regional freeways and bridges. Interstate 80 connects San Francisco with the Counties of Alameda, Contra Costa, Solano and Napa via the Bay Bridge. To the north, U.S. 101 links San Francisco with the Counties of Marin and Sonoma via the Golden Gate Bridge. To the south, U.S. 101 (the Bayshore Freeway) links San Francisco to the Counties of San Mateo and Santa Clara. The I-280 Freeway provides a direct link between the Project Area and southern portions of San Francisco County, as well as another freeway link to San Mateo and Santa Clara Counties. The I-280 Freeway terminates in the Project Area at Fourth and Berry Streets, with additional access provided just north of the Project Area at Sixth and Brannan Streets. U.S. 101 is about one-half mile west of the Project Area, and I-80 is about one-quarter mile north of the Project Area's northern boundary.

Freeway ramps analyzed in this EIR are those used by traffic from the Project Area or the rest of the Downtown & Vicinity. These access points, designated as "primary" or "secondary", are listed in Table VI.E.1, p. VI.E.4. Primary access points are those freeway ramps either within or close to the Project Area, while secondary access points are farther away from the Project Area.

Project Area Roadway Network

Unlike other areas of San Francisco, the Project Area does not have a well-developed and continuous street system. Although some north / south streets serving the Project Area provide high levels of roadway capacity, access between the southern portion of Mission Bay and downtown San Francisco is constrained by the CalTrain terminal and its associated tracks, China Basin Channel, and the I-280 ramps. The existing pattern of one-way or two-way street operations for the arterial streets within and adjacent to Mission Bay is indicated by roadway segment in Figure VI.E.2, p. VI.E.5.

All north / south streets between Second and Tenth Streets are major arterials, but only Third, Fourth, and Seventh Streets extend from the South of Market area into the


TO NORTH BAY
VAN NESS AVE.
Embarcadero
Montgomery
Powell
Civic Center
Van Ness
16th Street
MARKET ST.
MISSION ST.
HOWARD ST.
FOLSOM ST.
HARRISON ST.
6th ST.
5th ST.
4th ST.
3rd ST.
2nd ST.
BRYANT ST.
BRANNAN ST.
TOWNSEND ST.
KING ST.
BERRY ST.
I - 80
I - 80
BAY BRIDGE
TO EAST BAY
US - 101
US - 101
TO SOUTH BAY
0
MISSION BAY BOUNDARY
BART ROUTE AND STATION
CALTRAIN ROUTE AND STATION
MUNI METRO ROUTE AND STATION
FERRY BUILDING
TRANSBAY TRANSIT TERMINAL

Mission Bay

SOURCE: Barton-Aschman Associates, Inc.

FIGURE VI.E.1
REGIONAL TRANSPORTATION FACILITIES
SERVING THE DOWNTOWN & VICINITY

TABLE VI.E.1: PRIMARY AND SECONDARY FREEWAY ACCESS POINTS

Freeway/Direction	On-Ramp	Off-Ramp
Primary:		
I-80/Eastbound	Fifth and Bryant/a/ Eighth and Bryant	Fourth and Bryant/a/ Seventh and Bryant
I-80/Westbound	Fourth and Harrison/a/ Seventh and Harrison	Fifth and Harrison/a/ Eighth and Harrison
I-280	Sixth and Brannan/a/ Mariposa and Pennsylvania/a/	Fourth and Berry/a/ Sixth and Brannan/a/ Mariposa and Indiana/a/
Secondary:		
I-280	Army and Pennsylvania	Army and Indiana
U.S. 101/Southbound	Tenth and Bryant	
U.S. 101/Northbound		Ninth and Bryant Mariposa and Vermont
I-80/Eastbound	Sterling and Bryant/b/ First and Harrison/a/ Essex and Harrison/a/	
I-80/Westbound		Fremont and Harrison

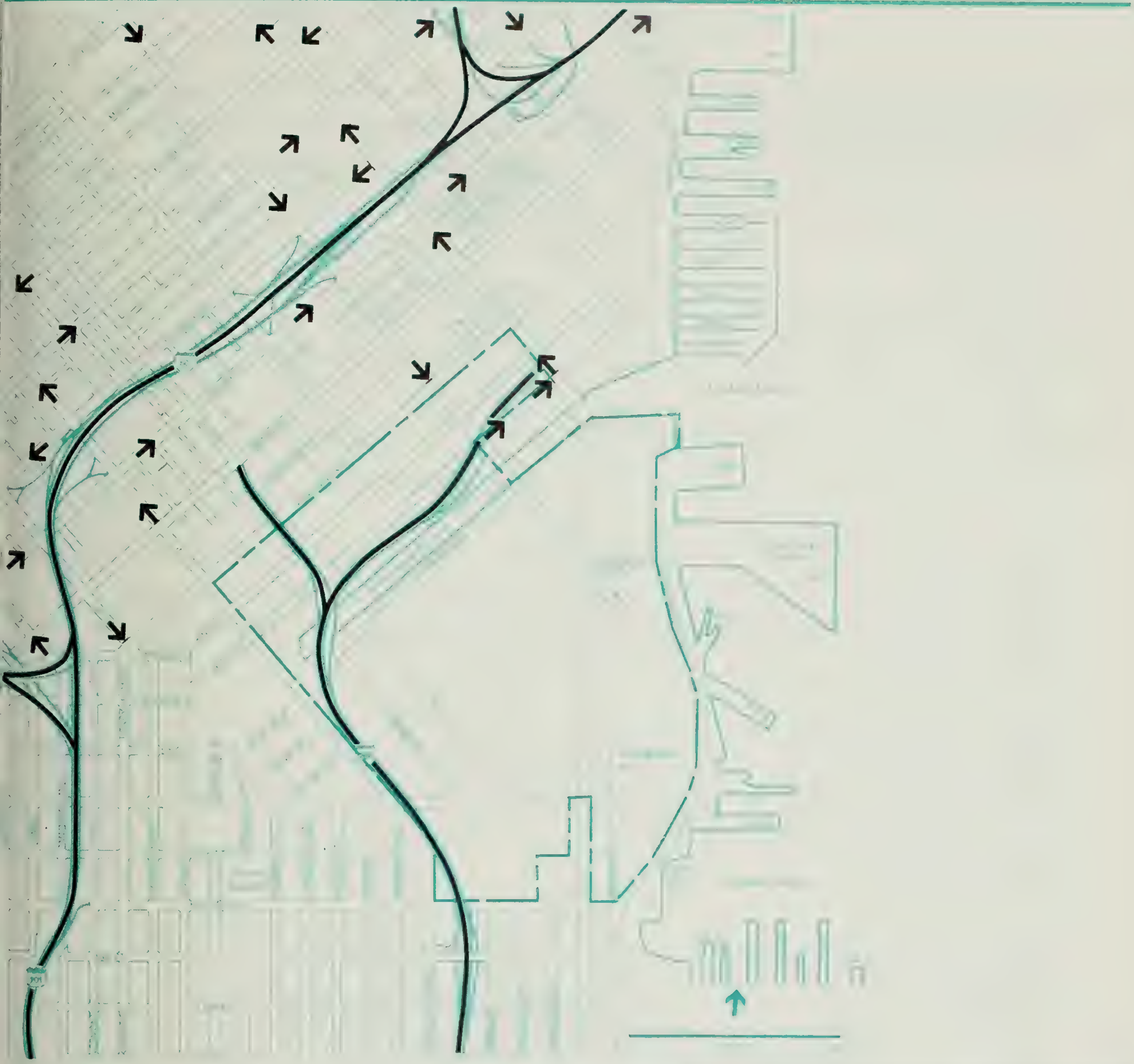
/a/ Traffic counts and Level of Service analyses for these intersections are described on pp. VI.E.7-VI.E.13.

/b/ Use of the Sterling Street on-ramp is restricted to carpools and trucks during the hours of 4:00 to 6:00 p.m. on weekdays.

SOURCE: Barton-Aschman Associates, Inc.

Project Area south of China Basin Channel. Intersections of these north / south streets with major east / west streets, such as Harrison, Bryant, Brannan, and Townsend Streets, are controlled by traffic signals.

Third and Fourth Streets form a one-way couplet between Berry and Market Streets, with four northbound lanes on Third Street and four southbound lanes on Fourth Street south to Townsend Street. At the northern boundary of the Project Area between Townsend and



—— – —— MISSION BAY BOUNDARY

→ DIRECTION OF TRAVEL ON ONE-WAY STREETS

NOTE: All Major Street Operations Are Two-Way, Unless Noted Differently

FIGURE VI.E.2
PATTERN OF ONE-WAY AND TWO-WAY
STREETS IN AND NEAR THE PROJECT AREA

SOURCE: Barton-Aschman Associates, Inc.

King Streets, Fourth Street contains a northbound contraflow lane for buses only, while between King and Berry Streets the northbound lane is open to all traffic. Both Third and Fourth Streets are two-way south of Berry Street, where Third Street provides four travel lanes (two in each direction), and Fourth Street provides two lanes southbound and one northbound.

Third and Fourth Streets cross China Basin Channel via two open-span bascule drawbridges, completed in 1933. The two drawbridges are operated and maintained by the San Francisco Department of Public Works under the jurisdiction of the U.S. Coast Guard. Bridge tenders are on duty 24 hours a day at each bridge, because the bridges may be opened for boats at any time.

Third Street, south of its intersection with Fourth Street, provides direct access from the Project Area south to the Lower Potrero and Central Waterfront Areas. South of Islais Creek Channel, Third Street continues in a southwesterly direction through the South Bayshore and Bayview Areas.

Fifth and Sixth Streets are two-way streets, generally providing two lanes in each direction between Market Street and the northern portion of the Project Area. Fifth Street terminates at Townsend Street, and Sixth Street at the I-280 on- and off-ramps at Brannan Street.

Seventh Street, immediately adjacent to I-280, is the western boundary of the Project Area. South of Brannan Street, this two-directional roadway contains two travel lanes and two parking lanes. North of Brannan Street, Seventh Street becomes a one-way street, with four northbound lanes to Market Street. Seventh and Eighth Streets form a one-way couplet between Brannan and Market Streets. Ninth and Tenth Streets are also a one-way couplet, with Ninth northbound and Tenth southbound. All of these north-south streets contain four lanes through this area north of Brannan Street and access ramps to/from I-80 or U.S. 101.

Brannan and Townsend Streets are both two-way east / west streets. While Brannan Street contains four lanes, Townsend Street's effective width is reduced by striping from four lanes east of Fourth Street to two lanes west of it. Townsend Street connects the northern portion of the Project Area with the Showplace Square area to the west.

Berry Street contains three lanes eastbound from the I-280 off-ramp at Fourth Street to Third Street, where all three lanes turn onto Third Street. Between Third Street and The

Embarcadero, Berry Street is a four-lane, two-way street. West of Fourth Street, Berry Street is discontinuous because of the I-280 Freeway structure and Southern Pacific rail trackage. The street terminates east of Seventh Street.

King Street is a two-way street, extending from Division Street to Second Street. Although wide enough to accommodate four traffic lanes, King Street is striped for only one travel lane in each direction. Between Third and Seventh Streets, the surface of King Street is in deteriorated condition.

Several streets, connecting the Project Area with surrounding residential or industrial neighborhoods to the west and south, have steep grades and provide access to the Project Area primarily for immediate local-area trips (i.e., their utility for regional service is limited). Third Street is the only major north / south arterial, providing two-way operation across four lanes. Pennsylvania Avenue is a two-way extension of Seventh Street south of 16th Street; it provides access to I-280 on- and off-ramps at Mariposa, 25th and Army Streets, primarily for nearby neighborhoods. Sixteenth Street is a major east / west arterial connecting the southern part of the Project Area to the Upper Market, Inner Mission, Potrero Hill, and Showplace Square areas. This roadway, varying between two and four lanes in width, provides a connection to the areas west of U.S. 101, but does not have an interchange with U.S. 101. Mariposa Street, an east-west arterial two blocks south of 16th Street, connects the Project Area to an interchange with I-280 (via on- and off-ramps to and from the south). Farther to the west, Mariposa Street also serves an off-ramp from (northbound) U.S. 101. However, Mariposa Street's steep grades through the residential Potrero Hill and Inner Mission areas make the one-lane connection to the U.S. 101 off-ramp ineffective for serving the Project Area.

Traffic Volumes at Project Area Intersections and Freeway Access Points

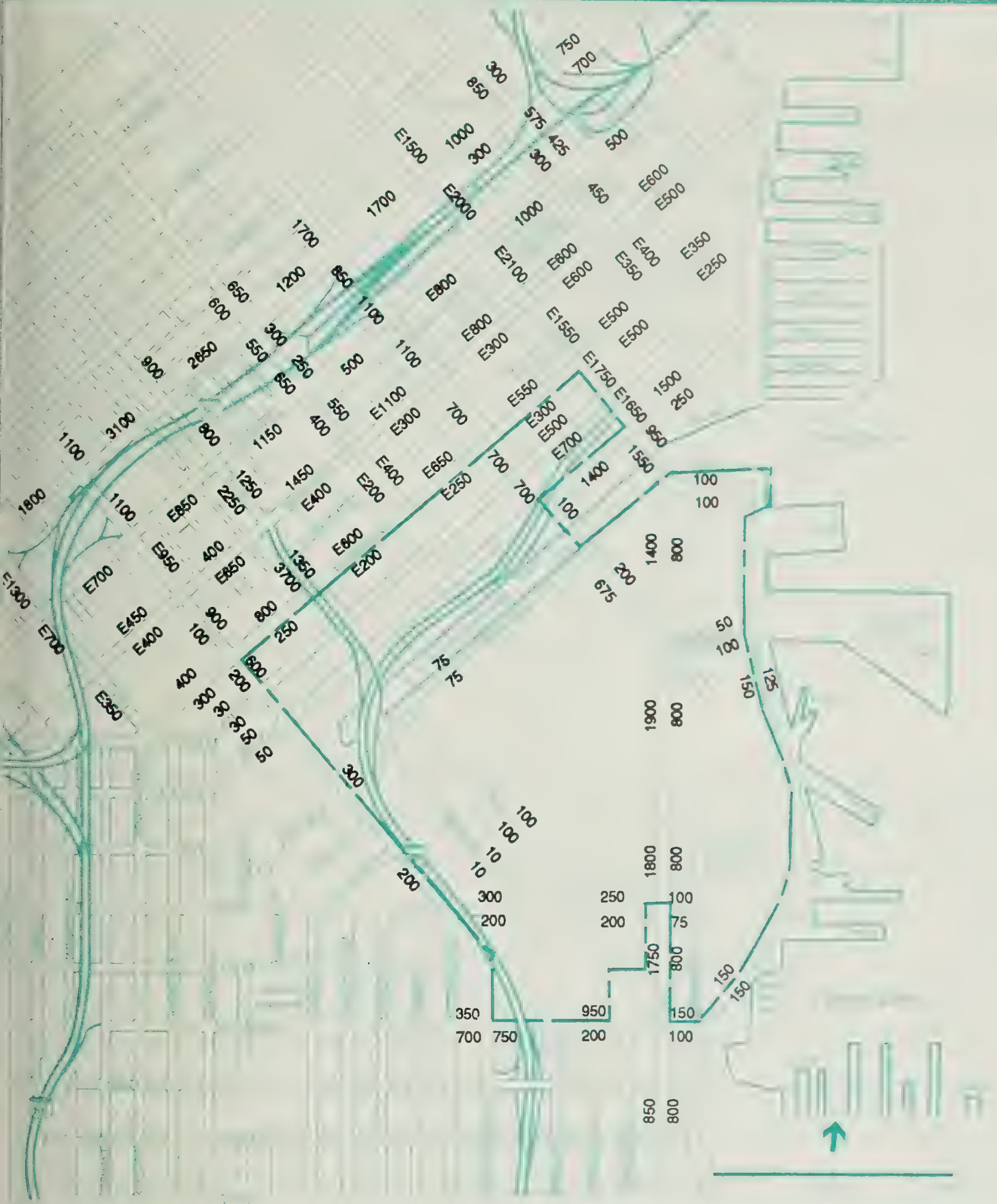
The analysis of traffic conditions that follows is based on counts conducted at key intersections and freeway access points in the fall of 1985./2/ Those locations were chosen in consultation with City of San Francisco Planning and Public Works staff, and were considered critical to describing existing traffic conditions within and adjacent to the Project Area.

Analysis of the 24-hour counts determined that the daily peak hour of traffic occurs during the p.m. peak period (4:00 to 6:00 p.m.). Analysis of intersection traffic counts conducted between the hours of 3:30 and 6:30 p.m. indicated that 4:30 to 5:30 p.m. is the actual p.m. peak hour of traffic for most of the intersections in and near the Project Area. The few exceptions noted were the intersections near the ramps to or from I-80 and I-280, where the p.m. peak hour typically occurs earlier (i.e., 4:15 to 5:15 pm). That offsetting of the peak hour is assumed to be caused by a large number of drivers wanting to obtain access to or from the freeways prior to the area-wide afternoon peak hour of traffic. Additionally, as the intersections at freeway ramps are used by vehicles from throughout the Downtown & Vicinity, their usage patterns reflect more than just local traffic patterns. For those ramp intersections, the levels are heavily dependent upon the traffic flow near the Bay Bridge and at the junction of U.S. 101 and I-80. Bad weather conditions, accidents or vehicles stalled on the freeways limit traffic flow through the ramps and affect the intersections' Level of Service (LOS) directly.

The variation in traffic volumes between each individual intersection's peak-hour volumes and its 4:30 to 5:30 p.m. volumes is minimal for the intersections within the Project Area. Therefore, for the purpose of analyzing operating conditions of intersections, the system or area-wide peak hour has been set to be from 4:30 to 5:30 p.m., coinciding with the system peak hour analyzed for the Downtown area in the Downtown Plan EIR. The p.m. peak hour volumes recorded in 1985 on street segments between intersections, shown in Figure VI.E.3, are used in the following paragraphs to explain the operating conditions occurring at intersections.

The intersections on Third Street south of China Basin Channel were counted in 1985 as having the highest p.m.-peak-period and peak-hour volumes of all the intersections within the Project Area. Three intersections along Third Street - Fourth and Mission Rock, 16th, and Mariposa Streets - were counted as having the highest volumes. Those three intersections have the highest volumes because of the combination of two p.m. peak travel flows. The first travel flow consists of outbound (southbound) travel from the Downtown & Vicinity on Third Street (South of Berry Street) that is coming from Fourth Street and from The Embarcadero via Berry Street on its way to the I-280 ramps at Mariposa Street, or is going further south on Third Street to other neighborhoods in San Francisco. The second, smaller, travel flow on Third Street consists of inbound (northbound) travel from southeast San Francisco into the Downtown & Vicinity and the northern neighborhoods of San Francisco.

The next highest volumes were recorded at the intersection of Fourth and Berry Streets, and Fourth and Townsend Streets. At Fourth and Berry, traffic on Fourth Street emanating from the Downtown & Vicinity, and headed south across the Fourth Street



750
700
300
850
575
425
500
E1500
1000
300
300
E600
E500
1700
E2000
450
1000
1700
E2100
E600
E600
E400
E350
E350
E250
650
1200
850
E800
600
1100
800
2650
550
300
250
1100
E800
E300
E1550
E500
E500
500
E1750
E1650
1500
250
3100
1100
650
550
800
400
1150
E1100
E300
700
E550
E300
E500
E700
950
1550
1800
1100
E850
2250
1250
1450
E400
E200
E400
E650
E250
700
700
100
1400
100
100
E700
E950
400
E850
3700
1350
E600
E200
675
200
1400
800
E1300
E700
E450
E400
100
800
800
250
50
100
125
150
E350
400
300
30
30
50
200
300
75
75
1900
800
300
100
100
10
10
1800
800
200
300
200
250
200
100
75
1750
800
150
150
350
700
750
950
200
150
100
850
800

— — MISSION BAY BOUNDARY

000 TRAFFIC VOLUMES BASED ON COUNTS

E000 ESTIMATED TRAFFIC VOLUMES

Only one number is shown for one-way streets, and two numbers are shown for two-way streets.

Mission Bay

FIGURE VI.E.3
1985 P.M. PEAK-HOUR TRAFFIC VOLUMES

SOURCE: Barton-Aschman Associates, Inc.

Bridge, crosses (northbound) traffic headed into the Downtown & Vicinity from the I-280 off-ramp at the intersection. The travel flows southbound on Fourth Streets also affect the Fourth and Townsend Streets intersection.

The discontinuity of the north-south street system between Fourth and Seventh Streets within the Project Area, the use of Seventh Street to reach the Potrero Hill neighborhood, and the need for some of the Project Area traffic to use the intersection of Seventh and Townsend Streets to get to the I-280 ramps at Sixth and Brannan are reasons why the Seventh and Townsend Street intersection experiences volumes very similar to (and somewhat greater than) those at Fourth and Townsend Streets. All the other intersections within the Project Area were counted as having much lower p.m. peak volumes because those intersections contain a northbound street (Third and Berry), or roadway segments with only one through lane in each direction (Seventh/Mississippi/16th and Pennsylvania and Mariposa).

Of the intersections outside the Project Area where counts were taken, the intersection of Sixth and Brannan, where the I-280 on- and off-ramps intersect the arterial street system, was counted as having the highest p.m.-peak-period and -hour volumes of any intersection, either serving as a freeway access point or located within the Project Area. The next highest volumes were on intersections along Harrison Street, where on- and/or off-ramps to/from I-80 are located at Seventh, Fifth, Fourth, and First / Essex Streets. Volumes on the Bryant Street intersections (at Fifth, Fourth and (near) Second Streets) were counted to be substantially lower than for their counterparts on Harrison Street, because Harrison Street serves outbound (west and southbound) traffic from the Financial District, while Bryant Street serves primarily outbound (eastbound) traffic from the lower-density Civic Center and western C-3 district.

The highest street (segment) volumes within the Project Area occur on Third Street, because that arterial not only serves surrounding activities, but also is a major north-south link between the Downtown & Vicinity and southern San Francisco. The next highest roadway volumes were recorded on Berry Street, where traffic from the I-280 off-ramp heads east to Third Street in order either to get on I-80 (the Bay Bridge) or to travel to northeastern San Francisco. All other roadway segments within the Project Area recorded much lower volumes. Even southbound Fourth Street recorded p.m.-peak-hour volumes that were about half of those recorded on northbound Third Street.

Intersection Operating Conditions

Operating characteristics of intersections are described by use of the concept of Level of Service (LOS). LOS is a qualitative description of an intersection's operation, based on traffic delay and maneuverability. An intersection's LOS can range from A, representing free-flow conditions, to F, representing jammed conditions./3/ The results of the LOS calculations performed for the intersections within the Project Area and at adjacent freeway access points are presented in Table VI.E.2. The methodologies used to calculate the Levels of Service are described in Appendix E. p. XIV.E.16.

Of the intersections within the Project Area, the following operate in the p.m. peak hour at LOS A or B: Fourth and Townsend Streets, Seventh and Townsend Streets, Fourth and Berry Streets, and Third and 16th Streets. Those intersections operate in uncongested conditions during the p.m. peak hour, with all queues clearing in a single signal cycle.

One intersection, Third and Mariposa Streets, operates at LOS C during the p.m. peak hour. There, light congestion occurs, with occasional backups created on the critical approach when vehicles turn from northbound Third Street to westbound Mariposa Street.

Three intersections within the Project Area, Third / Fourth / Mission Rock Streets, Seventh / 16th / Mississippi Streets, and Pennsylvania Avenue and Mariposa Street, operate at LOS D. At those intersections, substantial congestion occurs on the critical approaches, but the overall intersection operates adequately. Cars may be required to wait through more than one cycle (at the signalized intersection of Third / Fourth / Mission Rock Streets), but no long-standing queues are formed. The critical movements for those respective intersections are as follows: left turns from northbound Third Street onto northbound Fourth Street vs. southbound (through) traffic on Third Street at Third / Fourth / Mission Rock Streets; left turns from southbound Seventh Street onto 16th Street; and left turns from southbound Pennsylvania Avenue onto Mariposa Street.

The most congested intersection within the Project Area is Third and Berry Streets, where the intersection operates at LOS E during the p.m. peak hour. Severe congestion occurs at that intersection because all vehicles travelling eastbound on Berry Street must turn either left or right at Third Street, the former merging with the northbound through traffic on Third Street, the latter combining with the heavy left-turning traffic movement from westbound Berry Street onto southbound Third Street.

TABLE VI.E.2: 1985 INTERSECTION LEVELS OF SERVICE

	PM Peak Hour	
	V/C /a/	LOS /b/
Signalized Intersections in Project Area		
Third and Berry	0.98	E
Third and Fourth / Mission Rock	0.83	D
Third and Mariposa	0.74	C
Third and 16th	0.69	B
Fourth and Townsend	0.31	A
Fourth and Berry	0.63	B
Seventh and Townsend	0.52	A
Unsignalized Intersections in Project Area		
Seventh and 16th/Mississippi	/c/	D
Pennsylvania and Mariposa	/c/	D
Signalized Freeway Access Points		
First and Harrison (I-80 on-ramp)	1.00 /d/	F
Second and Bryant (Sterling St. HOV I-80 on-ramp)	0.37	A
Second and Harrison (to I-80 on-ramps)	0.79 /d,e/	C
Fourth and Harrison (I-80 west on-ramp)	0.69	B
Fifth and Bryant (I-80 on-ramp)	1.00 /d/	F
Fifth and Harrison (I-80 off-ramp)	0.78	C
Sixth and Brannan (I-280 ramps)	1.00 /d/	F
Seventh and Harrison (I-80 west on-ramp)	0.60	B
Tenth/Potrero and Division and Brannan (near U.S. 101 ramps)	0.54	A
Eleventh and Division and Bryant (U.S. 101 on-ramp)	0.69	B
Unsignalized Freeway Access Point		
Harrison and Essex (I-80 on-ramp)	/d/	F

/a/ V/C stands for volume-to-capacity ratio.
/b/ LOS is Level of Service; see Appendix E. for definitions.
/c/ LOS calculated represents the worst movement level of service calculated for the intersection. For unsignalized intersections, V/C ratios are not calculated.
/d/ These intersections are saturated, with vehicles not moving through them because of back-ups from the I-80 on ramps. LOS F reflects the delays induced by poor traffic flow on I-80, not the ratio of volume-to-capacity actually calculated.
/e/ LOS calculated by weighting approach volumes to calculate the intersection's critical volume.

SOURCE: Barton-Aschman Associates, Inc.

Outside Mission Bay, where counts were taken at the freeway access points, the following distinct categories of p.m.-peak-hour operating conditions were recorded:

- First, the intersections along Bryant Street operate in uncongested conditions (LOS A or B), except at Fifth Street where there is an on-ramp to I-80. This intersection is saturated with vehicles turning onto I-80 from Fifth and Bryant Streets, despite the provision of dual turning lanes on the Bryant Street approach and dual lanes on the I-80 on-ramps.
- Second, some of the intersections along Harrison Street operate in uncongested conditions (LOS B or C). The intersection of Fifth and Harrison Streets, which contains an off-ramp from I-80, is one of the Harrison Street intersections where some traffic movements do not experience severe delays. That intersection was recorded to be operating at LOS C. The intersection of Fourth and Harrison Streets, which contains an on-ramp to westbound I-80 and operates at LOS B, is another Harrison Street intersection where some traffic movements do not experience severe delays.
- Third, at all other (eastbound) freeway access points along Harrison Street, severe congestion is experienced at intersections because heavy traffic flows onto I-80 and the Bay Bridge cause delays at the on-ramps. Delays, especially at First and Harrison Streets, are sufficiently severe to reduce the intersection's throughput of vehicles (i.e., vehicles in the lanes serving the I-80 on-ramp do not pass through the intersection without queuing for at least one signal cycle).
- Fourth, heavy traffic flows to and from the I-280 ramps create the most congested intersection within or adjacent to the Project Area, Sixth and Brannan Streets. Those mixing and crossing traffic flows cause operational failure of the intersection during most of the p.m. peak period.

Movable Bridges on China Basin Channel

The flow of traffic across China Basin Channel is occasionally interrupted by the opening of two drawbridges - the Francis "Lefty" O'Doul Bridge on Third Street and the Peter R. Maloney Bridge on Fourth Street. Operation of these bridges responds to the movements, to and from San Francisco Bay, of houseboats and pleasure boats berthed in China Basin Channel.

Each average weekday, the Third Street Bridge is opened 2.8 times and the Fourth Street Bridge 1.0 time. On Saturdays, Sundays, and holidays, the Third Street Bridge is opened an average of 6.5 times per day and the Fourth Street Bridge 2.2 times per day. Each opening and closing of a bridge delays street traffic by an average of four minutes./4/

Project Area Transit Facilities and Services

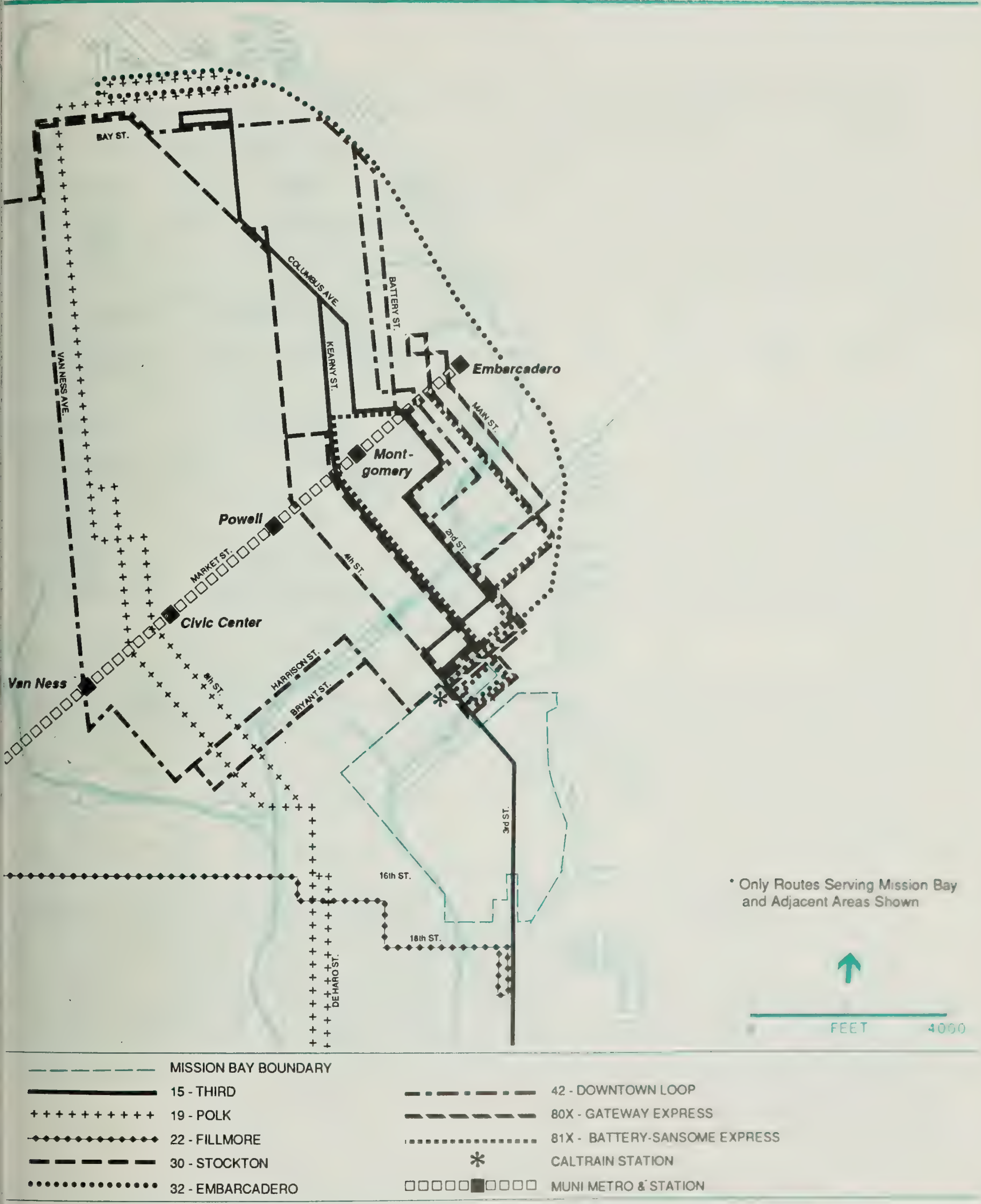
The Project Area is served by the San Francisco Municipal Railway (MUNI) and CalTrain. MUNI's bus routes provide connections between the Project Area and services provided by the following five regional transit operators in downtown San Francisco: BART, AC Transit, SamTrans, Golden Gate Transit, and private transit services. MUNI's seven routes serving the Project Area are described below. CalTrain, whose San Francisco terminal is in the Project Area, but whose service is considered regional, is described on p. VI.E.36. Figure VI.E.1, p. VI.E.3, shows the locations of the regional transit routes and terminals serving the Mission Bay Project Area and the Downtown & Vicinity.

MUNI

MUNI offers the following three types of motor coach and trolley transit services to the Project Area: direct service, nearby freeway express service, and nearby peripheral local service. MUNI routes providing direct service to the Mission Bay Project Area are the 15-THIRD, 30-STOCKTON, 32-EMBARCADERO, 42-DOWNTOWN LOOP, 76-MARIN HEADLANDS, 80X-GATEWAY EXPRESS, and 81X-FINANCIAL DISTRICT (CALTRAIN) EXPRESS. Except for the 15-THIRD, which operates through the Project Area, all MUNI routes terminate at the CalTrain Station (at Fourth and Townsend Streets)./5/ MUNI bus routes in or within one block of the Project Area are shown in Figure VI.E.4.

All of the MUNI routes directly serving the Project Area provide connections between the CalTrain Terminal and one or more regional transit terminals or stations in downtown San Francisco. The 15-THIRD passes within one block of the Montgomery Street BART Station, and passes next to (when southbound), and within two blocks (when northbound), of the Transbay Terminal. The 30-STOCKTON passes within one block of the Montgomery Street BART Station (northbound) and the Powell Street BART Station (southbound). The 32-EMBARCADERO serves the Ferry Building directly and stops within two blocks of the Embarcadero BART Station. The 42-DOWNTOWN LOOP serves the Van Ness Avenue MUNI Metro Station and the Transbay Transit Terminal directly, and passes between the Embarcadero and Montgomery Street BART Stations. Routes 80X and 81X provide peak-period shuttle service within two blocks of the Transbay Transit Terminal and between the Montgomery Street and Embarcadero BART stations.

The peak-period frequency of service for the MUNI bus routes serving the Project Area is very high./6/ On average, 10-20 buses per hour are operated during the peak hours of


BAY ST.
COLUMBUS AVE.
BATTERY ST.
KEARNY ST.
Embarcadero
MAIN ST.
VAN NESS AVE.
Mont-
gomery
Powell
MARKET ST.
2nd ST.
4th ST.
Civic Center
Van Ness
HARRISON ST.
BRYANT ST.
8th ST.
3rd ST.
16th ST.
18th ST.
DE HARO ST.
0
FEET
4000
MISSION BAY BOUNDARY
15 - THIRD
19 - POLK
22 - FILLMORE
30 - STOCKTON
32 - EMBARCADERO
42 - DOWNTOWN LOOP
80X - GATEWAY EXPRESS
81X - BATTERY-SANSOME EXPRESS
CALTRAIN STATION
MUNI METRO & STATION

* Only Routes Serving Mission Bay and Adjacent Areas Shown

ission Bay

FIGURE VI.E.4
MUNI BUS AND METRO SERVICES
IN MISSION BAY AND ADJACENT AREAS*

OURCE: S.F. Municipal Railway
and Barton-Aschman Associates, Inc.

service, which are generally between 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. The frequency of service is high partly because all of these routes serve the CalTrain terminal, but primarily because many of the routes serve a variety of distinct travel markets outside Mission Bay. On the most heavily used routes that serve a number of markets (e.g., the 15-THIRD and 30-STOCKTON), the frequency of service is high even during midday hours, when up to eight to ten buses per hour are scheduled. Those two routes provide service past midnight, with the 15-THIRD operating all night. Schedules of MUNI bus routes serving the Project Area and adjacent areas are on file at the San Francisco Department of City Planning, 450 McAllister Street, San Francisco.

The LOS provided by transit agencies is derived from a concept similar to that developed for highway operations. For this analysis, the ratio of passengers to seats has been used as the unit to measure consistently the LOS provided by each of the transit agencies serving the Project Area and the Downtown & Vicinity. The ratio of passengers (demand) to seats (capacity) is used to describe the LOS that would be available on transit vehicles at each route's maximum (passenger) load point and is discussed further in Appendix E. p. VI.E.16.

MUNI has established service policies that are based on permitting standees during peak-period transit trips, with the number of standees varying by vehicle type. The combination of seated and standing passengers is called the "load factor." For long-range planning purposes, a load factor standard of 1.25 persons per seat was used to measure LOS on MUNI.

All but two of the MUNI routes serving the Project Area experience their maximum passenger loads north of the Project Area, between the Project Area and the core of downtown. The only two MUNI bus routes with a maximum load point within the Project Area are the two shuttle routes connecting the CalTrain Station with the downtown core. The maximum volumes on-board the buses for Routes 80X-GATEWAY EXPRESS and 81X-FINANCIAL DISTRICT EXPRESS occur at the Fourth and Townsend Streets Station, because those routes do not serve any other travel markets.

Load factors vary greatly among the MUNI bus routes serving the Project Area, as shown in Table VI.E.3. The 15-THIRD and 42-DOWNTOWN LOOP operate at LOS D, and their maximum load points occur at Third and Brannan Streets and Van Ness Avenue and Turk Street, respectively. The 30-STOCKTON and 81X-FINANCIAL DISTRICT EXPRESS operate at LOS C, and their maximum load points occur at Stockton and Jackson Streets

TABLE VI.E.3: 1985 RIDERSHIP AND CAPACITY FOR MUNI ROUTES SERVING THE PROJECT AREA

	P.M. Peak Hour				P.M. Peak Period			
Route	Riders	/a/ Capacity	/b/ R/C	/c/ LOS	Riders	/a/ Capacity	/b/ R/C	/c/ LOS
15-THIRD	990	790	1.25	D	1700	1375	1.24	D
30-STOCKTON	1125	1190	0.95	C	1950	2050	0.95	C
32-EMBARCADERO	245	465	0.53	B	420	800	0.53	B
42-DOWNTOWN LOOP	400	330	1.21	D	700	615	1.14	D
76-MARIN HEADLANDS					Sunday service only			
80X-GATEWAY EXPRESS	80	145	0.55	B	140	250	0.56	B
81X-FINANCIAL DISTRICT EXPRESS	330	350	0.94	C	560	600	0.93	C

/a/ The unit of seats has been used to define capacity. See discussion on p. VI.E.16.
/b/ Passengers per seat equals demand-to-capacity (D/C).
/c/ Level of service, as defined in Transportation Research Board Circular 212. See Appendix E. p. XIV.E.19 for details.

SOURCE: Information provided by MUNI for Routes 15 and 42 via letter from Peter Strauss, MUNI, to Barton-Aschman Associates dated August 29, 1986, and for the other routes via memorandum from Peter Strauss, MUNI, to Chi Hsin Shao, Department of City Planning, dated April 7, 1986.

and Fourth and Townsend Streets, respectively. The 32-EMBARCADERO and 80X-GATEWAY EXPRESS operate at LOS B, with their maximum load points occurring at The Embarcadero and Pier 36 and Fourth and Townsend Streets, respectively.

In order to describe the relationship between passenger volumes on MUNI routes and existing activities within the Project Area, two kinds of counts were taken. Counts were taken on the 15-THIRD, the only route that traverses the Project Area, at both the northern and southern boundaries of the Project Area. For all other routes serving the Project Area, counts were taken at the intersection of Fourth and Townsend Streets, the only location of bus stops for those routes within Mission Bay./7/

The availability of free parking, the low density of existing activities, and the limited number of different land uses within walking distance of each other, make current transit demand to or from the Project Area very low, except at the bus stops serving the CalTrain Station. Counts of passengers boarding or alighting from the 15-THIRD show that, on the average, one person (at the most) gets on or off a bus in the Project Area south of the CalTrain Station during the p.m. peak hour.

During the p.m. peak period, the 80X-GATEWAY EXPRESS and 81X-FINANCIAL DISTRICT EXPRESS, special shuttle routes serving the CalTrain Station, transport the greatest number of passengers alighting at the stops around Fourth and Townsend Streets. The 30-STOCKTON transports the next largest number of passengers alighting at the CalTrain station, followed by the 15-THIRD and 32-EMBARCADERO.

Maritime Activities

Descriptions of piers adjacent to Mission Bay and of their activities are provided in VI.B. Land Use, Business Activity, and Employment, p. VI.B.36. The aspects of the utilization of each pier most relevant to the analysis of transportation conditions and the associated requirements for truck or rail service are described in this section.

Pier 48, currently used to receive newsprint imported from Canada and Scandinavia, is the pier adjacent to the Project Area handling the most vessel movements. Data from the Port of San Francisco show that the annual average of vessel calls delivering newsprint to Pier 48 has increased steadily during the past five years. On the basis of tonnage, newsprint is the principal commodity shipped into or out of the Port of San Francisco./8/ All newsprint terminals on San Francisco Bay are at the Port of San Francisco -- at Pier 48 and the combined Piers 15 and 17, and 27 and 29. Pier 48 receives approximately 35 to 40% of the annual newspaper tonnage shipped to the Port. The 30 annual vessel calls at that pier in 1985 represented fewer than 5% of the Port's total vessel calls, however, primarily because the large capacity of the ships transporting newsprint reduces the need for more numerous vessel calls./9/

Pier 48's finger pier design is considered to be well-suited to the handling of newsprint because newsprint is unloaded directly there from the ships onto the trucks that will transport it to its final destination. Although Pier 48 is served by trackage owned by the San Francisco Belt Railroad, newsprint is not trans-shipped via rail cars, but is distributed throughout the region by trucks.

In 1985, Pier 50 was used for the following three purposes: final assembly of CalTrain cars, ship repair, and as a Container Freight Station (CFS)./10/ The lease for the assembly of CalTrain coaches at Shed A, expired at the end of 1987.

The eastern and southern portions of Pier 50 are currently used for ship repair. Pier 54 also is being used for that purpose. Piers 50 and 54 were estimated to have accounted for approximately 10% of the Port's ship repair activity in 1985./9/ Ship repair requires the use of lands off the pier for parking vehicles used by ship repair workers.

The CFS on Pier 50 is at Sheds A and C. At the CFS, railroad boxcars arrive from outside the region and their cargo is transloaded onto containers placed on trucks, which deliver the containers to ships docked to the south of the Project Area at the San Francisco Container Terminal (Piers 80 and 94 to 96). Approximately 30,000 tons of cargo are unloaded annually from rail cars to trucks at the CFS./8/ That activity (container packing or unpacking between rail and truck) is considered by shippers to be economically advantageous when it occurs directly on port property. Some of these economic advantages include not having to use city streets to transport overweight containers between ships and other modes, and being able to use for transloading less costly vehicles owned by a port or a stevedore company.

Pier 52, containing an ATSF barge facility, currently is not in use, but has not been officially abandoned by the Company./11/ The barges which transported rail cars between the ATSF terminal in Richmond and the ATSF China Basin Yard in San Francisco are no longer used. Pier 64 also is not now being used for maritime purposes.

Maritime-Related Traffic Volumes

Trip-generation rates from studies of the San Francisco Container Terminal were used to calculate the magnitude of annual and daily rail and truck traffic associated with current maritime activities at Piers 48 through 64./12/ Rail traffic, which occurs only on Pier 50, varies widely over the year. While in 1985, an average of one rail car per week was unloaded at the Container Freight Station, in 1987 the comparable figure was less than one rail car per month.

All maritime activities occurring in 1985 at Piers 48, 50 and 54 generated an estimated 2,245 daily vehicular (auto and truck) trips, of which approximately 10% (or 225) occurred between 4:30 and 5:30 p.m. and 18% (or 400) occurred between 4:00 and 6:00 p.m./13/ Those estimates are based on the following conditions:

- Having to convert the number of annual arrivals and departures of ships and rail cars into estimates of average daily travel volumes is difficult because of the irregular pattern of ship arrivals and departures. Approximately 6,750 truck trips and 4,500 trips by other vehicles are generated annually by persons other than employees travelling to and from cargo-handling activities on Piers 48 and 50. Although fluctuations in the arrivals and departures of ships and rail cars make the determination of daily trip averages difficult, approximately 50 vehicle trips are generated on a day when cargo-handling activities occur on Piers 48 and 50. Those estimates of trips generated by persons who are not employees correspond with the data available for shipping terminals in the Bay Area that approximately 62% of vehicles counted at marine terminals are cargo trucks and the remainder autos, pick-up trucks and service vehicles./14/

- Developing an estimate of trips generated by ship repair activities is difficult because such work is labor-intensive and does not occur continuously. On the basis of the estimated maximum complement of persons employed and the number of annual berth-days at Piers 50 and 54 when ships are being repaired, on an "average" day approximately 800 auto and 100 truck trips are generated by that maritime activity./15/

Trips made by employees not engaged in ship repair have dropped from the 1984-86 levels when the CalTrain cars were being assembled. Since the end of 1987, when that activity was completed, an estimated 1,300 daily auto trips are made by employees not engaged in ship repair.

Rail Freight Facilities and Services

Four rail freight companies, three of which serve the Project Area, provided rail freight service in San Francisco in 1985. The Southern Pacific Transportation Company (SP); the Atchison, Topeka and Santa Fe Railway Company (ATSF); and the San Francisco Belt Railroad own tracks within the Project Area. Tracks abandoned by the Western Pacific Railroad Company (WP) are south and west of the Project Area./16/ Existing rail trackage is depicted in Figure VI.E.5. (See VI.B. Land Use, Business Activity, and Employment, p. VI.B.8 for a more detailed discussion of the types of businesses in the Project Area using rail freight service.)

Southern Pacific Transportation Company

The Southern Pacific (SP) Transportation Company's mainline trackage approaches San Francisco from San Mateo County in an alignment generally parallel to U.S. 101 south of the I-280 / U.S. 101 interchange. North of the I-280 / U.S. 101 interchange, the SP mainline tracks are parallel to I-280. In the Project Area, the two mainline tracks are parallel to and directly east of Seventh Street and Pennsylvania Avenue. North of Tunnel

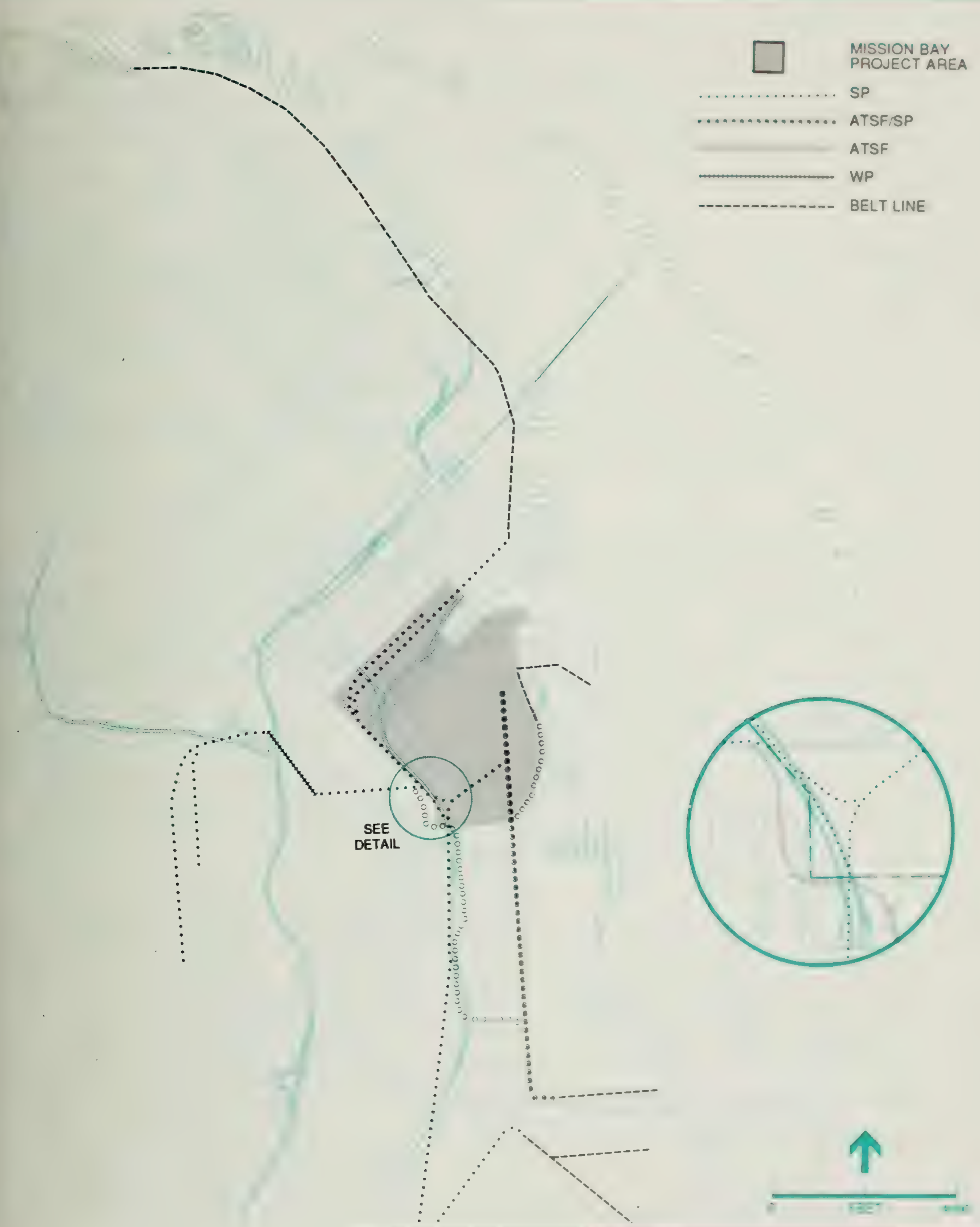

▨ MISSION BAY PROJECT AREA
SP
ATSF/SP
ATSF
WP
BELT LINE
SEE DETAIL
FEET

FIGURE VI.E.5
RAIL TRACKAGE IN SAN FRANCISCO

SOURCE: Barton-Aschman Associates, Inc.

Number 1, beginning at 18th Street, the SP mainline tracks are at-grade, but because of the use of the I-280 right-of-way the tracks cross only two streets at-grade -- 16th and King Streets. Between 22nd and Townsend Streets, the elevated I-280 freeway was built over the surface and tunnel segments of SP's mainline trackage.

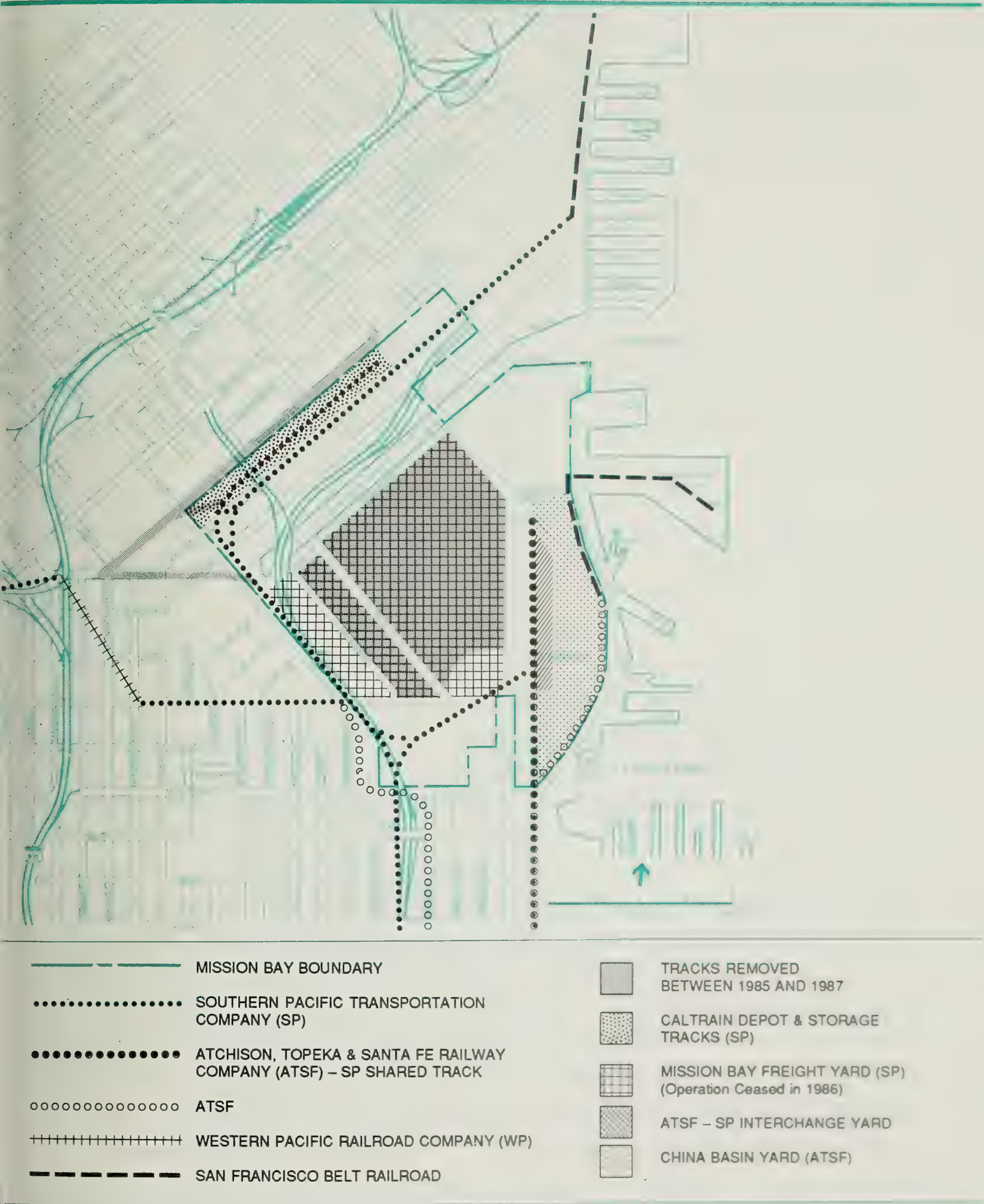
In 1985, six lead tracks extending from SP's mainline track in Mission Bay served local rail freight traffic./17/ Rail freight facilities in the Project Area are depicted in Figure VI.E.6. The South-of-Market Area is no longer served by three lead tracks that used to extend north to Fifth, Townsend and Division Streets. Those lead tracks were removed because the reconstruction of the streets on which they ran provided an opportunity for the Southern Pacific Railroad to discontinue rail freight service to an area with very low demand./18/

In 1987, three lead tracks remained in operation. The first lead track, extending west along 16th Street from Pennsylvania Avenue, serves the Showplace Square area and 18th and Harrison areas. The Showplace Square area also used to be served by a lead track extending west from Townsend and Seventh Streets. The second lead track, extending northeast from King Street, serves the Belt Railroad Interchange Yard at King and The Embarcadero. The third lead track, extending east from 16th Street, serves the ATSF-SP Interchange Yard, north of 16th and east of Third Streets. That lead track also served the (former) Mission Bay Freight Yard, bounded by Third, Fourth, Channel, Sixth, and 16th Streets. Before 1986, the center of the Mission Bay Freight Yard included tracks that were used for switching and storage of freight cars.

In 1985, the Mission Bay Freight Yard had the capacity to store approximately 500 cars and to receive, classify, and assemble into trains approximately 75 to 125 cars per day./19/ In September 1985, SP ceased operations in the Mission Bay Freight Yard, except for providing rail service to two customers located on the western border of the area, near Seventh Street. The tracks and freight office within the Mission Bay Freight Yard were removed, and the operations performed in the Mission Bay Freight Yard were relocated to SP's Bayshore Yard in Brisbane.

Atchison, Topeka and Santa Fe Railway Company

ATSF's two rail yards in the Project Area are east of Third Street. The ATSF-SP Interchange Yard is bounded by El Dorado, Fourth, Illinois, and 16th Streets and is served by a lead track extending northeast from the SP mainline, across 16th Street. The


MISSION BAY BOUNDARY
SOUTHERN PACIFIC TRANSPORTATION COMPANY (SP)
ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY (ATSF) – SP SHARED TRACK
ATSF
WESTERN PACIFIC RAILROAD COMPANY (WP)
SAN FRANCISCO BELT RAILROAD
TRACKS REMOVED BETWEEN 1985 AND 1987
CALTRAIN DEPOT & STORAGE TRACKS (SP)
MISSION BAY FREIGHT YARD (SP) (Operation Ceased in 1986)
ATSF – SP INTERCHANGE YARD
CHINA BASIN YARD (ATSF)

Mission Bay

FIGURE VI.E.6
RAIL FREIGHT FACILITIES IN THE PROJECT AND ADJACENT AREAS

SOURCE: Barton-Aschman Associates, Inc.

function of the Interchange Yard was to provide tracks for switching and storing cars to be assembled onto trains at the (former) Mission Bay Freight Yard. (Trains would then be routed southward on the SP mainline.)/20/

ATSF's China Basin Yard is bounded by China Basin, Mission Rock, and Illinois Streets and is served by the ATSF-SP shared track on Illinois Street. The China Basin Yard includes tracks that have been used for switching and storing freight cars.

ATSF's use of both yards and Pier 52 has declined to the point where a yard crew is transported from Richmond when required instead of being assigned permanently to San Francisco./21/ The crew uses an engine leased from SP to transport rail cars to customers' sidings.

ATSF's Indiana Street lead track connects to SP's 16th Street lead west of the Project Area. South of the Project Area, the Indiana Street lead connects to ATSF's Illinois Street track at 25th Street.

San Francisco Belt Railroad

The San Francisco Belt Railroad (Belt Line) is operated by Kyle Railways for the Port of San Francisco and serves businesses and piers under the Port's jurisdiction. The Belt Line provides rail service between port facilities and intercity rail carriers whose tracks do not serve the piers directly.

Access to the Northern Waterfront is provided by a lead track from the SP mainline tracks connecting with San Francisco Belt tracks near The Embarcadero at King Street. Those San Francisco Belt tracks provide access to Piers 46, 44, 40, 38, 36, 34, 32, and other Northern Waterfront piers. The northernmost switching district of the Belt Railroad also contains a track extending south on The Embarcadero to Berry Street, east of Third Street. That track reappears on the Third Street Bridge and ends on Third Street approximately halfway between Channel and Mission Rock Streets. The discontinuous sections of track on Berry and Third Streets have not been used since the 1940s./22/

The middle switching district of the San Francisco Belt Railroad contains tracks in the Project Area that extend north from the Illinois Street ATSF-SP shared track near Fourth and Illinois Streets to serve Piers 48, 50, and 54. Since 1979, freight cars have served only the Mission Rock Terminal (Pier 50)./22/ The San Francisco Belt Railroad's southernmost rail switching district is further south, at the San Francisco Container Terminal on both sides of Islais Creek Channel.

Western Pacific Railroad

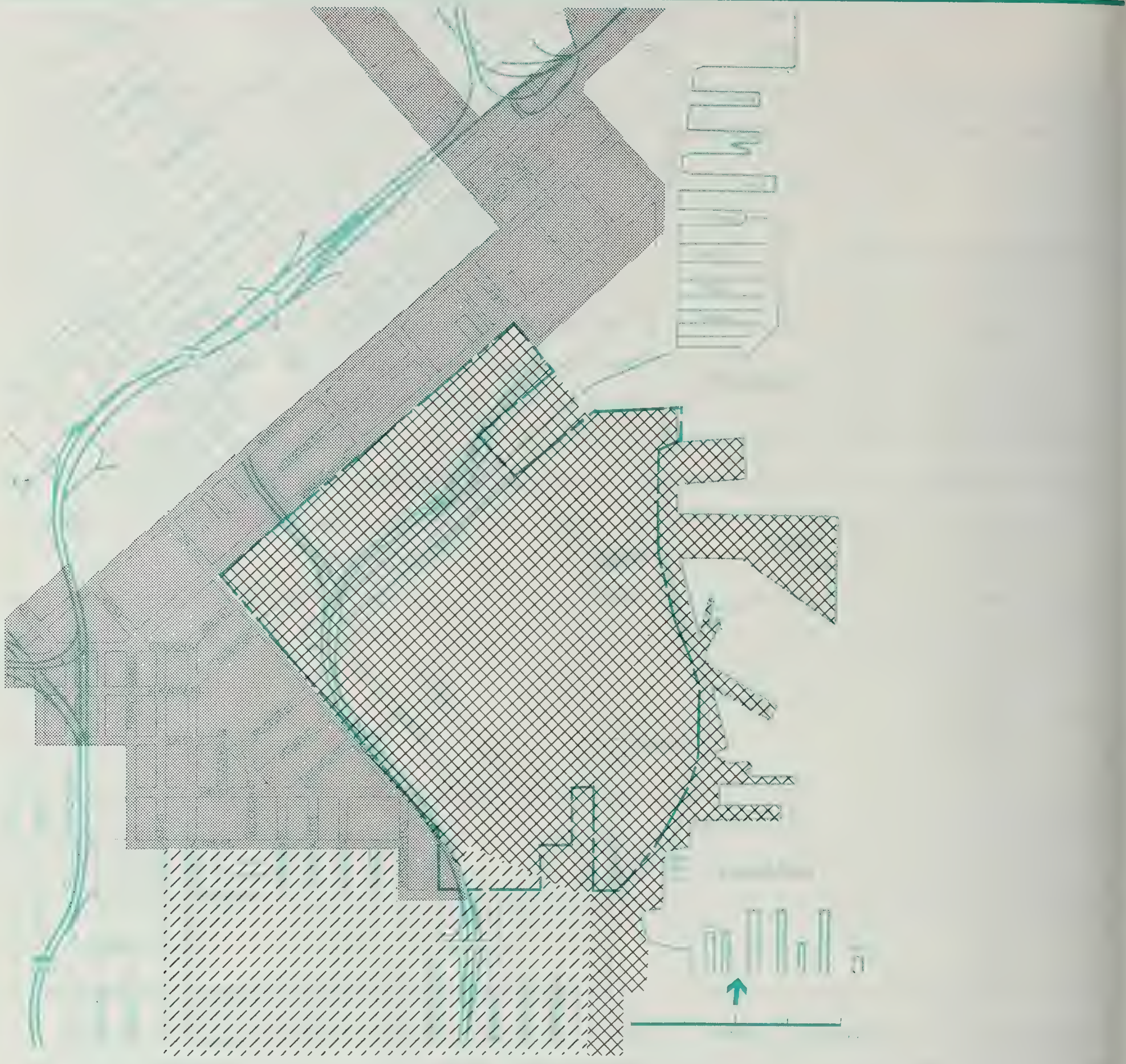
All of Western Pacific's trackage in San Francisco is outside the Project Area. That trackage was abandoned by WP in 1985 and now belongs to the Union Pacific Railroad. The tracks nearest the Project Area are to the west, parallel to Seventh Street between Division Street and Pennsylvania Avenue. An operating agreement allows the SP to use a segment of those tracks between Rhode Island and Division Streets for access to its customers west of Mission Bay. Those tracks used to extend generally in a southeasterly direction to WP's Army Street Freight Yard. However, WP's Potrero Hill Tunnel has not been usable since the 1950s, and tracks have been removed between Mariposa Street and the tunnel, and in the former WP Army Street Freight Yard.

Rail Freight Traffic

Railroad freight activity data were analyzed for the 1983 to 1985 time period in order to describe short-term trends for the four railroads serving San Francisco. Railroad cargo movements are described by using carloadings as the unit of measure; a carloading is the full utilization of a railroad car's capacity for the shipment of goods or materials.

Rail freight activity has decreased in San Francisco and along the Peninsula, particularly over the last 25 years. In the late 1950s, for example, Southern Pacific operated eight freight trains in and out of San Francisco per day. Since October 1985, SP has operated one freight train (the Mission Bay - Warm Springs Turn) in each direction six days per week. The southbound train leaves San Francisco after midnight, while the northbound train enters San Francisco in the mid-morning hours.

Carloading counts provided by the railroads for 1983 through 1985 were analyzed to show each railroad's annual carloadings for the following geographic areas: all of San Francisco; the Project Area; areas north and west of the Project Area; and areas south of the Project Area. The latter three geographic areas are shown in Figure VI.E.7. A residual category was created to show carloadings that were known to be in San Francisco, but with exact geographic locations that could not be determined from available records.



— — — MISSION BAY BOUNDARY

▦ MISSION BAY RAIL AREA

▒ AREAS WHERE RAIL SERVICE IS DEPENDENT ON TRACKS IN PROJECT AREA

▨ AREAS OUTSIDE OF MISSION BAY WITH TRACKS UNAFFECTED BY MISSION BAY TRACKS

Mission Bay

FIGURE VI.E.7
GEOGRAPHIC AREAS USED TO DESCRIBE RAIL FREIGHT VOLUMES

SOURCE: Barton-Aschman Associates, Inc.

Annual carloadings originating or terminating in San Francisco declined from 5,863 in 1983 to 3,702 in 1985 (a decrease of 37%). The declines in rail freight movements varied greatly by company and by geographic area, as shown by the volumes listed in Table VI.E.4./23/ Annual carloadings have continued to decline, especially to or from the Project Area and areas to the north where lead and switching tracks were removed since 1985 (see p. VI.E.25).

Volumes of carloadings handled by the San Francisco Belt Railroad have not been included in Table VI.E.4, because the Belt Railroad connects the inter-city rail operators with the Port; i.e., the Belt Railroad's carloadings are assumed to be included in totals for inter-city and inter-state railroads. Data provided by the Port of San Francisco indicate that the number of revenue cars handled by the Belt Railroad has been decreasing steadily, with the number of inbound (loaded) car movements decreasing from 166 in 1983 to 53 in 1985./24/ By 1988, that trans-shipment and switching activity, which occurs north of Mission Bay, along the Port's northern waterfront, had declined to about 20 car movements per year. Non-revenue switching of cars is handled by the Belt Railroad at the San Francisco South Container Terminal at Pier 96.

The following reasons for declines in rail freight activity in San Francisco have been cited in a recent study/25/:

- grain exports have decreased;
- demand for sand, gravel and building materials has decreased;
- demand for wholesale shipments of furniture has decreased;
- distribution and warehousing of goods in San Francisco has lessened;
- major rail users have ceased operations;
- Western Pacific has abandoned and Southern Pacific has curtailed rail service; and
- markets for exported machinery have diminished.

The only increase in rail traffic to San Francisco has been generated by intermodal (rail/ship) shipments via direct rail service at the Port's Intermodal Container Transfer Facility at Islais Creek, south of the Project Area. Intermodal rail traffic to the Port began in July 1984.

Pedestrian and Bicycle Travel

Five intersections within the Project Area were surveyed to determine pedestrian and bicycle flows and conditions. Volumes of pedestrians by direction were counted at five crosswalks during the noon and p.m. peak 15-minute periods. Volumes of pedestrians on

TABLE VI.E.4: TRENDS IN RAIL FREIGHT CARLOADINGS/a/

Area	1983 SP/b/	1983 ATSF/c/	1983 WP/d/	1983 Total	1984 SP	1984 ATSF	1984 WP	1984 Total	1985 SP	1985 ATSF	1985 WP/e/	1985 Total
SAN FRANCISCO	3,815	98	1,950	5,863	3,384	37	1,313	4,734	2,873	29	800	3,702
Mission Bay/f/	1,865	77	0	1,937	1,511	18	0	1,528	1,157	17	0	1,174
Affected by Mission Bay Project/g/	1,321	0	0	1,321	1,036	0	0	1,036	1,084	0	0	1,084
Outside of Mission Bay and unaffected by Mission Bay Project/h/	520	21	1,950	2,491	435	19	1,313	1,767	552	12	800	1,364
Geographic location could not be determined/i/	109	0	0	114	402	0	0	403	80	0	0	80

/a/ Volumes of carloadings shown include train movements originating and terminating in each area.
/b/ SP – Southern Pacific Transportation Company
/c/ ATSF – Atchison, Topeka and Santa Fe Railway Company
/d/ WP – Western Pacific Railroad Company (Union Pacific Railroad Company)
/e/ Complete data for 1985 were not available for industries served by Western Pacific south of Army Street. Estimates for the last six months of 1985 for these industries were prepared by Barton-Aschman Associates, Inc., based on data for the first six months of 1985. The WP abandoned service to San Francisco in 1985.
/f/ For this analysis, Mission Bay is defined to be bounded by Townsend Street, San Francisco Bay, Mariposa Street, and Interstate 280. SP zone numbers 1, 4, and 9 were determined to be in Mission Bay. ATSF track numbers 950, 951, 955, and Pier 52 were categorized to be in Mission Bay.
/g/ SP zones 2, 5, 6, 7 and 8 are dependent upon trackage that goes through the Project Area. These zones are located to the north and west of the Project Area. As noted on p. VI.E.21, the Fifth, Division and Townsend Street leads that used to serve SP Zone 2 were removed by the Southern Pacific Railroad in 1987.
/h/ All other railroad service areas not noted above are outside the Project Area and contain tracks south of the Project Area.
/i/ Some carloadings could not be allocated to a specific geographic area on the basis of the information available.

SOURCE: Barton-Aschman Associates, Inc., based on data provided by Southern Pacific Transportation Company, Atchison, Topeka and Santa Fe Railway Company, and Western Pacific Railroad Company (Union Pacific Railroad Company).

sidewalks were obtained only at Fourth and Townsend Streets, which is the only intersection within the Project Area with sidewalk volumes large enough to count. The noon and p.m. peak 15-minute periods were chosen as the analysis periods on the basis of previous studies that showed pedestrian activity to be greatest during those two time periods.

The LOS concept, similar to that used to describe operating conditions for intersections, has been used to analyze pedestrian flows in relation to crosswalk or sidewalk capacities. Pedestrian flow rates (i.e., pedestrians per foot of effective sidewalk width per minute) were calculated from the counts for each of the sidewalks. In the methodology used to determine the Levels of Service for pedestrians, different ranges of flow rates are classified into different flow categories (or regimes)./26/ (The different pedestrian flow regimes are described in Appendix E. p. XIV.E.21).

Pedestrian volume currently is low throughout the Project Area. As shown in Table VI.E.5, pedestrian activity was classified as being in the "open" flow regime at all but one of the surveyed locations during both the noon and p.m. peak 15-minute periods. The only "unimpeded" flow classification was recorded on the south and west legs of the intersection of Fourth and Townsend Streets. That less-than-best flow regime was experienced at that intersection because of pedestrian activity generated by persons boarding or alighting from trains at the CalTrain terminal and, to a lesser extent, by passengers transferring between MUNI bus routes serving the intersection.

Counts of bicyclists revealed the same pattern described above for pedestrians, with the intersection of Fourth and Townsend Streets recording the highest number. While the majority of pedestrians within the Project Area travel only as far as the CalTrain station, bicyclists are attracted not only to the CalTrain Station, but also to the flat arterial streets that traverse the area and provide a connection between downtown and residential neighborhoods to the south and southwest. The peak 15-minute counts of bicyclists recorded during the noon and p.m. peak hours are contained in the background data available for public review at the Office of Environmental Review, Department of City Planning, 450 McAllister Street, San Francisco.

Parking Conditions

Both on-street and off-street parking spaces are available within the Project Area. Public and private parking lots, as well as designated and uncontrolled curb parking spaces, are available.

TABLE VI.E.5: PEDESTRIAN FLOW LEVELS

		Flow Regime/a/ (Measured Flow Rate)/b/							
	Time	North Leg		West Leg		South Leg		East Leg	
Third and Berry	Noon	Open	(0)	Open	(0.09)	Open	(0.01)	Open	(0.08)
	p.m.	Open	(0.03)	Open	(0.07)	Open	(0)	Open	(0.01)
Third and China Basin	Noon	Open	(0)	Open	(0.10)	Open	(0.02)	Open	(0.03)
	p.m.	Open	(0)	Open	(0)	Open	(0)	Open	(0.02)
Fourth and Berry	Noon	Open	(0.03)	Open	(0.03)	Open	(0.01)	Open	(0.19)
	p.m.	Open	(0.03)	Open	(0.03)	Open	(0.01)	Open	(0.19)
Fourth and Channel	Noon	Open	(0.05)	Open	(0.03)	Open	(0.01)	Open	(0.11)
	p.m.	Open	(0.17)	Open	(0.11)	Open	(0.01)	Open	(0.03)
Fourth and Townsend									
Crosswalk	Noon	Open	(0.03)	Open	(0.19)	Open	(0.11)	Open	(0.25)
	p.m.	Open	(0.35)	Unimpeded	(1.47)	Unimpeded	(1.62)	Open	(0.30)
Sidewalk	p.m.	---		Unimpeded	(1.39)	Unimpeded	(0.89)	---	

/a/ For flow regime descriptions, see Appendix E. p. XIV.E.__.
/b/ Flow rate calculations, pedestrians per foot of sidewalk width per minute, assume a crosswalk width of 10 feet.

SOURCE: Counts conducted by Barton-Aschman Associates, Inc. on Tuesday-Thursday, October 22-24, 1985.

An inventory of parking supply and a survey of parking demand were conducted for street segments within and near the Project Area. Streets surveyed included Townsend, King, Channel, Third, Fourth, Seventh, and Sixteenth./27/ An estimated 1,600 on-street parking spaces were counted./28/ Approximately 78% of all on-street spaces were occupied at the time of the survey; occupancy rates for the areas north and south of China Basin Channel were different from one another. In the area north of the Channel, especially the area north of the Project Area characterized by more intensive development, 89% of on-street parking spaces were occupied. South of the Channel, where less intensive uses and more vacant land can be found, the on-street parking occupancy rate dropped to about 65%.

The Project Area contains five parking lots -- four public and one private (restricted). The lots are clustered together in the area bounded by China Basin Channel, King, Third and Fourth Streets, and provide approximately 1,160 public and 45 private off-street parking spaces./29/ Occupancy rates in 1985 for those parking lots ranged between 47% and 77% and averaged 60%. Parking rates were generally between $1 and $2 per day.

Throughout the Project Area, especially south of China Basin Channel, unauthorized or uncontrolled parking takes place on vacant undeveloped blocks. Almost all of that parking activity is caused by employees or visitors to nearby industries.

REGIONAL TRANSPORTATION FACILITIES

Persons traveling to and from the Project Area use regional transportation facilities located elsewhere in the Downtown & Vicinity, and are part of cumulative travel between San Francisco and other counties in the Bay Region. Existing operating conditions for each highway and transit agency serving travelers to and from the Downtown & Vicinity or other areas of San Francisco and the Bay Region are presented in the following pages.

The concept of screenlines is used to describe the magnitude of travel from or to the Downtown & Vicinity, and to compare estimated travel volumes by mode of travel to capacities available for each mode./30/ Screenlines are hypothetical lines that would be crossed by persons traveling between the Downtown & Vicinity and other parts of San Francisco and the region. They are therefore the measurement points for the cumulative travel projections presented in this EIR analysis.

There are four screenlines in San Francisco, which are used to describe travel between the Downtown & Vicinity and the areas of San Francisco: northeast, northwest, southeast, and southwest San Francisco. In addition, there are three regional screenlines surrounding San Francisco, to measure travel to the North Bay, East Bay, and South Bay. The screenlines are shown in Figure VI.E.8.

Regional traffic and transit ridership demand is measured at the regional screenlines. However, the four San Francisco screenlines are used only for measuring local transit (MUNI) volumes. There are no screenlines for local traffic within San Francisco; as auto drivers can select their preferred route by choosing parallel streets within San Francisco's extensive grid network, presenting ratios of traffic demand to street capacity would not provide accurate conclusions about street operating conditions. The local intersection analysis therefore uses a different methodology, described in Appendix E. p. XIV.E.14. The results are presented on p. VI.E.144 (for 2000) and p. VI.E.167 (for 2020).

The regional screenlines surrounding San Francisco County are used to analyze the following types of trips:

- North Bay (Golden Gate) - All trips to Marin and Sonoma Counties via private vehicles, Golden Gate Transit buses or ferries, or other modes such as Red and White Fleet ferries;
- East Bay (Transbay) - All trips to Alameda, Contra Costa, Solano, and Napa Counties via private vehicles, BART or AC Transit, or other modes, such as charter buses;
- South Bay (Peninsula) - All trips to San Mateo and Santa Clara Counties via private vehicles, BART, CalTrain, SamTrans, or other modes.

The screenlines, by establishing the locations at which cumulative impacts are assessed, also provide a basis for identifying the numbers of travelers to or from the Downtown & Vicinity on each mode for each regional travel corridor, separately from travelers to and from the rest of San Francisco and the Bay Area region, during the p.m. peak period and hour.

Travel to and from the Downtown & Vicinity crossing the three regional and four San Francisco screenlines has been estimated for 1985, using a travel simulation model developed directly for this purpose, and calibrated by the use of actual travel data./31/ Estimates were prepared for the 1985 geographic distribution of travel (where people are going to and coming from), the modes of travel (the means by which people travel), the direction of travel (to or from the Downtown & Vicinity) and the peaking characteristics describing travel made during the 4:00 to 6:00 p.m. and 4:30 to 5:30 p.m. time periods (what proportions of daily trips occur during these times). The percentages of p.m. peak

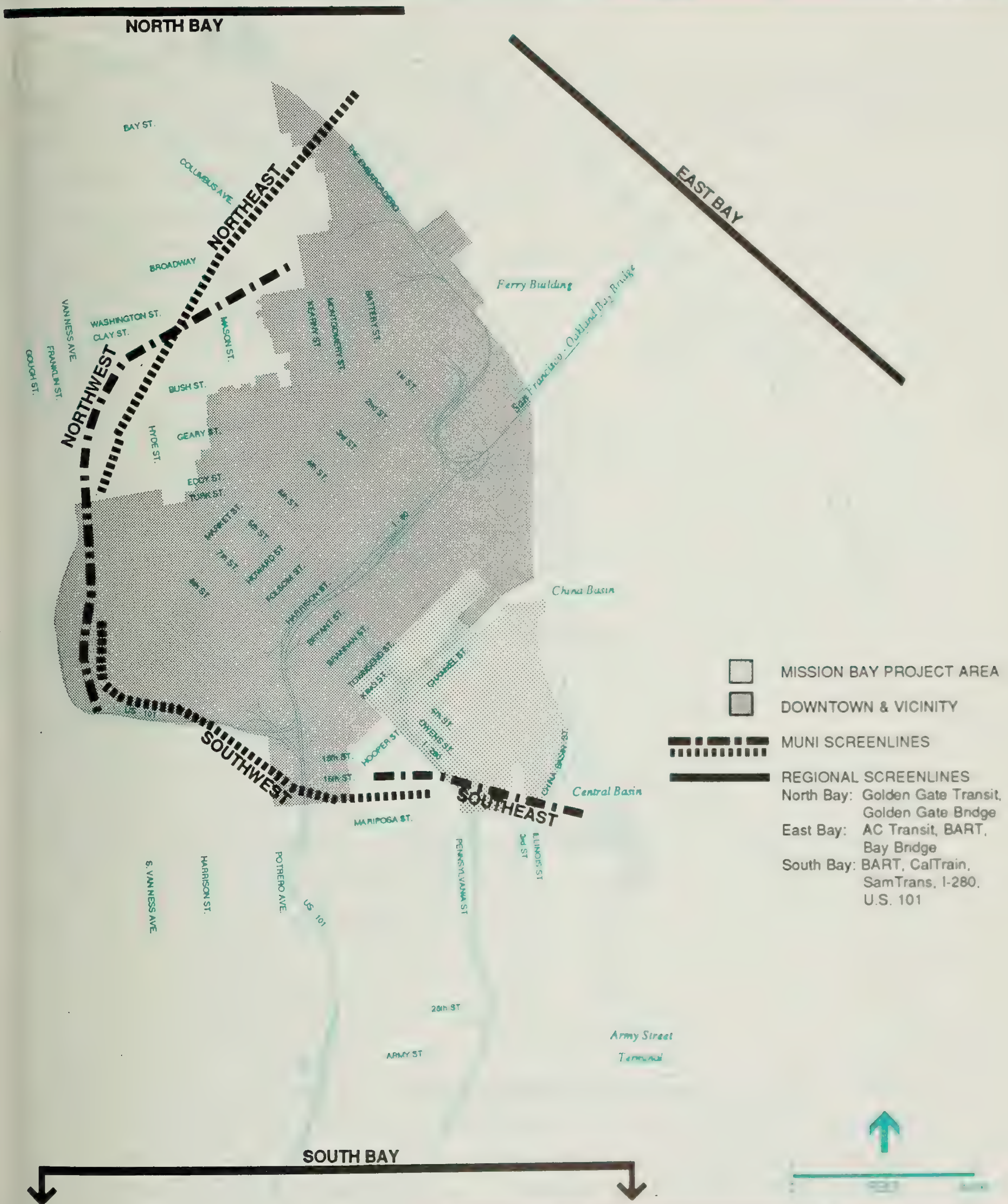

NORTH BAY
EAST BAY
NORTHEAST
NORTHWEST
SOUTHWEST
SOUTHEAST
SOUTH BAY
BAY ST.
COLUMBUS AVE
THE EMBARCADERO
BROADWAY
WASHINGTON ST.
CLAY ST.
VAN NESS AVE
FRANKLIN ST.
GOUGH ST.
MASON ST.
KEARNY ST
MONTGOMERY ST
BATTERY ST
Ferry Building
San Francisco - Oakland Bay Bridge
BUSH ST.
1st ST.
2nd ST.
3rd ST.
4th ST.
5th ST.
6th ST.
7th ST.
8th ST.
HYDE ST.
GEARY ST.
EDDY ST.
TURK ST.
MARKET ST.
HOWARD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
TOWNSEND ST.
KING ST.
I-80
China Basin
CHANNEL ST.
US 101
4th ST.
OWENS ST.
I-280
HOOPER ST.
16th ST.
18th ST.
CHINA BASIN ST.
Central Basin
MARIPOSA ST.
S. VAN NESS AVE
HARRISON ST.
POTRERO AVE.
US 101
PENNSYLVANIA ST
3rd ST
ILLINOIS ST
20th ST
ARMY ST
Army Street Terminal
MISSION BAY PROJECT AREA
DOWNTOWN & VICINITY
MUNI SCREENLINES
REGIONAL SCREENLINES
North Bay: Golden Gate Transit, Golden Gate Bridge
East Bay: AC Transit, BART, Bay Bridge
South Bay: BART, CalTrain, SamTrans, I-280, U.S. 101
FEET

FIGURE VI.E.8
MUNI AND REGIONAL SCREENLINES

SOURCE: Barton-Aschman Associates, Inc.

travel outbound from Downtown & Vicinity crossing each screenline are based on geographic distributions of where Downtown & Vicinity workers live (residence patterns) and on other regional travel data. The percentages of p.m. peak inbound travel from Downtown & Vicinity crossing each screenline are based on geographic distributions of where the residents of Downtown & Vicinity work, and on other regional data. The two primary sources of data used to create the 1985 travel estimates are recent surveys of employees in downtown San Francisco and of residents of the Bay Area./32/ Travel characteristics for 1985 established the base from which travel demand projections for 2000 (and 2020) were produced.

Fewer than 1% of the outbound trips produced in the Downtown & Vicinity in 1985 during the p.m. peak period and hour are estimated to come from the Mission Bay Project Area. The Project Area attracted an even smaller share of the inbound trips to the Downtown & Vicinity during the p.m. peak period and hour, probably accounting for about one-half of one percent of those trips.

Transit Operating Conditions at Screenlines

The numbers of travelers on board the different transit systems at the maximum load points for the routes or lines serving the Downtown & Vicinity are based on counts provided by the transit agencies. Those numbers, which are listed in Table VI.E.6 for all transit carries, include both travelers who began their trip within the Downtown & Vicinity, and travelers who began their trip elsewhere. The percentages of travelers crossing each screenline who are estimated to be traveling from the Downtown & Vicinity are described below for each transit agency, based on the travel simulation model developed for this analysis./33/

MUNI

Screenlines within San Francisco are used to compare p.m. peak-period travel demand on MUNI routes outbound from the Downtown & Vicinity against the capacity provided by the MUNI routes, grouped according to which of the four areas of San Francisco they serve./34/ MUNI routes were grouped by screenline on the basis of the location of the majority of the routes' alignment or stops within the northeast, northwest, southwest, and southeast areas of San Francisco depicted in Figure VI.C.1, p. VI.C.32. The maximum load point for each of the MUNI routes assigned to a screenline was used to establish the alignment of the screenline. MUNI screenlines are not based on imaginary boundaries that

TABLE VI.E.6: 1985 OUTBOUND TRANSIT RIDERSHIP AND CAPACITY AT SCREENLINES

		PM Peak Hour				PM Peak Period			
Screenline	Transit Operator	Riders	/a/ Capacity	/b/ R/C	/c/ LOS	Riders	/a/ Capacity	/b/ R/C	/c/ LOS
Northeast	MUNI	7,400	6,300	1.17	D	13,300	10,900	1.22	D
Northwest	MUNI	8,700	7,000	1.24	D	13,600	12,000	1.13	D
Southwest	MUNI	12,250	10,900	1.12	D	21,500	18,700	1.15	D
Southeast	MUNI	3,250	2,920	1.11	D	5,600	4,970	1.13	D
North Bay	Golden Gate								
	Bus	3,800	5,500	0.69	B	5,600	8,500	0.66	B
	Ferry	900	1,400	0.64	B	1,200	2,300	.52	B
East Bay									
	AC Transit	7,800	9,200	0.85	C	11,600	13,800	0.84	C
	BART	14,200	10,900	1.30	E	24,900	19,000	1.31	E
South Bay									
	BART/d/	6,500	9,200	0.71	B	11,000	19,600	0.56	B
	CalTrain	2,300	4,050	0.57	B	3,500	6,100	0.57	B
	SamTrans	1,600	1,900	0.84	C	1,900	2,600	0.73	B

/a/ For consistency of this analysis, the unit of seats has been used to define capacity (see p. VI.E.16 for more discussion).

/b/ Riders-per-seat provided.

/c/ Level of Service, as defined in Transportation Research Board Circular 212.

/d/ Includes travelers to southeast and southwest San Francisco and to San Mateo County.

SOURCE: Barton-Aschman Associates, Inc. adjusted 1984-1986 data supplied by the transit operators for use in the Mission Bay and South of Market EIRs to represent 1985 conditions. The letters containing the data are on file at the San Francisco Department of City Planning.

must be crossed by persons traveling from the Downtown & Vicinity, but represent the combination (over all routes) of maximum load points. Each such load point is the stop where the maximum (outbound) ridership on each route is recorded.

As discussed on p. VI.E.16, the unit of seats has been used consistently to describe the LOS occurring at each screenline, even though each transit agency establishes its own LOS policy. Some agencies, such as Golden Gate Transit, operate with the policy of providing a seat for every passenger, while other agencies, such as BART or MUNI, expect standees with their peak service policies.

During the p.m. peak hour and peak period, MUNI routes crossing the screenlines around the Downtown & Vicinity are (on the average) operating at LOS D, estimated on the basis of the volumes recorded at each route's maximum load point. The maximum load points on MUNI routes generally occur close to the boundary of the Downtown & Vicinity, with some of the routes recording the maximum p.m. peak volumes within the Downtown & Vicinity and others just outside that area. Because some of the MUNI routes cross more than one screenline, the demand figures cannot be added to describe total travelers. Similarly, the capacity figures are interdependent because some MUNI routes serve both the northeast and southeast parts of San Francisco, while other routes serve both the northwest and northeast.

At the screenlines, approximately 96% of the passengers traveling outbound on MUNI during the p.m. peak period are estimated to begin their trip within the Downtown & Vicinity. That overall average estimate may vary from about 90% to 98% over the various screenlines and routes during the peak period and peak hour./35/

CalTrain

The Peninsula Commute (rail) Service (CalTrain) extends from the San Francisco terminal at Fourth and Townsend Streets in the Project Area south through San Mateo and Santa Clara Counties and terminates in the City of San Jose. The Southern Pacific Transportation Company (SP) operates the trains under contract to the California Department of Transportation (Caltrans).

In 1985, CalTrain operated 46 one-way trains (23 round trips) per weekday to and from the station at Fourth and Townsend Streets./36/ Evening peak-hour (4:30 to 5:30 p.m.) service southbound was provided by seven trains. Those seven trains and four more trains provided southbound service during the evening peak period (4:00 to 6:00 p.m.).

In October 1986, CalTrain's weekday schedule was expanded from 46 to 52 trains. The new schedule reduces from 11 to 10 the number of trains leaving San Francisco between 4:00 and 6:00 p.m., and from seven to six the number of trains leaving between 4:30 and 5:30 p.m. The additional trains and the trains re-scheduled outside the peak period are intended to improve the frequency of off-peak service and to provide more trains serving San Francisco residents who commute to work in San Mateo and Santa Clara Counties.

The maximum load point of almost all trains operated on the CalTrain service during the p.m. peak period and hour occurs at the San Francisco Terminal. For all express trains and almost all other trains, the on-board volumes created by passengers boarding at the San Francisco Terminal are greater than the on-board volumes created by passengers boarding and alighting further south on the line. For some p.m. peak trains, the maximum load point occurs at South San Francisco, but the on-board volumes there typically are less than 10% higher than the boardings occurring at the San Francisco Terminal. On the average, CalTrain's southbound trains operate at LOS B when departing from the San Francisco Terminal during the p.m. peak period. Approximately 94% of the riders on board those trains are estimated to have begun their journey in the Downtown & Vicinity.

During the p.m. peak hour and peak period, on the average, 43% of the peak-period seats are empty when the trains leave the station. Monthly ridership statistics compiled for CalTrain indicate that fluctuations in demand among trains result in higher and lower demand-to-capacity ratios for individual trains, with more variability experienced during the peak period than during the peak hour.

BART

The Bay Area Rapid Transit District (BART) provides rail rapid transit service in San Francisco, Alameda and Contra Costa Counties. End-of-the-line terminals for BART are in Daly City (just south of the San Mateo County line); Concord and Richmond in Contra Costa County; and Fremont in Alameda County. BART's four stations in downtown San Francisco are approximately one mile north of the Project Area (see Figure VI.E.1, p. VI.E.3).

The ratios of passengers to seats on BART trains were calculated for two locations. For the East Bay screenline, the figures represent conditions on eastbound trains leaving the Embarcadero Station and entering the Transbay Tube. For the South Bay screenline, the figures represent conditions on westbound trains leaving the Civic Center. Travelers to southeast and southwest San Francisco, as well as to San Mateo County, are therefore included in those demand figures in order to describe the most congested point for westbound p.m. peak trains. In the aggregate, BART trains to Richmond, Concord and Fremont operate at an average LOS E, while BART trains to Daly City operate at LOS B during the p.m. peak hours. Approximately 89% to 93% of the BART riders crossing the

East Bay screenline during the p.m. peak hours, and 92% to 95% of BART riders on board when the westbound trains leave the Civic Center Station, are estimated to have begun their journey in the Downtown & Vicinity.

AC Transit

The Alameda - Contra Costa Transit District (AC Transit) operates transbay bus service between western Alameda and Contra Costa Counties and downtown San Francisco. Although some of AC Transit's Transbay routes are in service all day, most bus trips are oriented primarily to commuters. (During peak hours, the ten basic Transbay routes are expanded to 40 variations.) In San Francisco, AC Transit's bus routes operate only from the Transbay Terminal at First and Mission Streets, approximately one mile northeast of the Project Area.

AC Transit buses operate at LOS C during both the p.m. peak hour and p.m. peak period. AC Transit routes serving San Francisco record their maximum volumes when the buses depart from the Transbay Terminal (see Figure VI.E.1, p. VI.E.3). Approximately 95% of the travelers on board those buses when they leave San Francisco come from (originate in) the Downtown & Vicinity.

SamTrans

The San Mateo County Transit District (SamTrans) provides regional and local bus services in San Mateo County and portions of San Francisco. SamTrans operates three (all-day) mainline routes and five commuter (peak-period) routes to downtown San Francisco. Although all of SamTrans' mainline bus routes and three of the commuter bus routes terminate at the Transbay Terminal, bus stops available along Mission Street provide the closest transfer points to the Project Area (see Figure VI.E.1, p. VI.E.3).

The maximum p.m. peak volumes on SamTrans routes serving San Francisco occur when the buses reach their first stop for alighting in San Mateo County. SamTrans' inter-county routes operate at LOS C during the p.m. peak hour and LOS B during the two-hour p.m. peak period. Approximately 93% of SamTrans' peak-period riders on board the buses serving San Francisco are estimated to be coming from the Downtown & Vicinity.

Golden Gate Transit

The Golden Gate Bridge, Highway and Transportation District (Golden Gate Transit) operates or provides a variety of transit and ride-sharing modes between Sonoma and Marin Counties and downtown San Francisco. The District operates buses and ferries and organizes subscription bus pools and vanpools. Golden Gate Transit buses operate from the Transbay Terminal; however, some of the basic all-day bus routes stop on Folsom and Howard Streets, within about one-half mile of the Mission Bay Project Area. Golden Gate ferries dock at the Ferry Building (at the foot of Market Street), approximately 1.5 miles northeast of the Project Area (see Figure VI.E.1, p. VI.E.3).

Golden Gate buses and ferries operate at LOS B throughout the p.m. peak period. During the p.m. peak period, both the buses and ferries record their maximum passenger volumes when they leave San Francisco and cross into Marin County. Approximately 94% to 95% of the passengers on board Golden Gate buses when they cross the Golden Gate Bridge are estimated to have boarded within the Downtown & Vicinity. A lower percentage of Golden Gate ferry passengers, approximately 75% to 77%, are estimated to have begun their journey within the Downtown & Vicinity, with the remainder coming from tourist areas, such as Fisherman's Wharf.

The (privately owned) Red and White Fleet operates ferry services between Tiburon (in Marin County) and San Francisco's Ferry Building. Two trips depart from San Francisco during the 4:00 to 6:00 p.m. period.

Operating Conditions for Freeways and Bridges

The analysis of operating conditions on the bridges and freeways serving San Francisco is based on counts collected for this EIR and other available data. Operating conditions on I-80, U.S. 101, and I-280 have been described in a number of studies prepared by Caltrans, MTC, and the Golden Gate Bridge Highway and Transportation District. The following descriptions of operating conditions on the major highways connecting the Downtown & Vicinity with other parts of the region are taken from the most recent studies done for each highway.

Operating characteristics of bridges and freeways are described by use of the concept of LOS. LOS is a qualitative measure of the effects of traffic volume (in relation to capacity) on operating speed and travel time, traffic flow interruptions, freedom to maneuver, safety and convenience. Six LOS, A through F, have been established to identify the operating conditions existing on a highway or street under various combinations of traffic volume and speed. LOS A describes a condition of unconstrained free flow, while LOS F describes the most congested forced-flow conditions. The complete definitions of all six LOS, including the related ratios of volume to capacity (V/C), are presented in Appendix E. p. XIV.E.18.

San Francisco - Oakland Bay Bridge

The Bay Bridge (I-80) contains five freeway lanes in each direction. Between the Bridge and the I-80 route terminus in San Francisco at the U.S. 101 / I-80 interchange, the I-80 freeway is on a viaduct generally with three lanes in each direction, with additional lanes near interchanges to serve on-and off-ramps. Those auxiliary lanes at on- and off-ramps do not serve through-traffic flows. At the eastern end of the Bay Bridge, the Bridge's five lanes in each direction expand to 18 lanes westbound at the Toll Plaza and six lanes eastbound. Two to three lanes of the I-80 freeway continue in each direction through the distribution structure joining I-80 with I-880 (Nimitz Freeway) and I-580.

Caltrans reports that during the a.m. or p.m. peak hour, traffic volumes on the Bay Bridge typically reach a high of 9,500 to 9,700 vehicles per hour. Those maximum hourly volumes have been recorded at the two approaches to the Bay Bridge, where the metering lights at the Toll Plaza (on the east) and lane configuration (on the west) meter the volumes of vehicles that the Bridge can carry in the westbound and eastbound directions, respectively./37/

On the sampled day in (April) 1985, Caltrans counted approximately 9,450 vehicles crossing the Bay Bridge in the eastbound direction from 4:30 to 5:30 p.m. From 4:00 to 6:00 p.m., approximately 18,700 vehicles were counted traveling eastbound across the Bay Bridge./38/

During the 4:00 to 6:00 p.m. peak period, the Bay Bridge (span) is currently operating at LOS D eastbound, while the eastbound approach is operating at LOS E-F. (During the a.m. peak period, the westbound lanes on the Bridge are operating at LOS D, while the lanes on the westbound approach are operating at LOS E-F.) During the two-hour p.m. peak period, the eastbound lanes on the Bridge are operating at a volume-to-capacity ratio of 0.9 to 0.95 (LOS D). During the p.m. peak period, the average speed on the Bridge eastbound is about 35 mph, representing the condition of greatest throughput for the volumes it carries./39/ Although there is a small increment of available capacity on the Bay Bridge, the Bridge and its approaches are basically operating at congested conditions during the 4:00 to 6:00 p.m. peak period.

Of the vehicles traveling eastbound across the Bay Bridge, 50% in the peak hour and 46% in the peak period are estimated to be originating in the Downtown & Vicinity. Those percentages were derived in the course of calibrating the factors used to simulate travel from the Downtown & Vicinity./40/

Golden Gate Bridge

The Golden Gate Bridge (U.S. 101) provides four lanes of capacity in the peak direction of travel and two lanes of capacity in the off-peak direction. Those capacities are provided by reversing the use of lanes between Doyle Drive and the north end of the Bridge. The capacity of the Golden Gate Bridge available to serve southbound traffic is metered by the Toll Plaza at the south end of the bridge, and the number of lanes beyond on Doyle Drive and Route 1 Freeway through the Presidio. The capacity of the Golden Gate Bridge to serve northbound traffic is again metered by the roadways at the south end of the bridge, and to a lesser extent by the Toll Plaza, because this is the free direction of travel.

During the p.m. peak hour, the northbound lanes of the Golden Gate Bridge currently operate at LOS D (V/C = 0.9), with speeds averaging 30 to 35 mph. The Bridge operates below capacity during the two-hour p.m. peak period. LOS E (V/C = 0.93) and speeds averaging 25 mph are recorded on Doyle Drive, a six-lane conventional viaduct operated with four lanes in the peak-flow direction./41/ The freeway segment of northbound Park Presidio Drive operates at LOS D (V/C = 0.9), with speeds averaging 25 mph./42/

On a sampled day in September 1985, the Golden Gate Bridge District counted 6,500 vehicles traveling northbound on the Bridge between 4:30 and 5:30 p.m. Between 4:00 and 6:00 p.m., 12,800 vehicles were counted crossing the Bridge in the northbound direction. Approximately 45% of the p.m.-peak-hour and 42 % of the p.m.-peak-period vehicles crossing the Golden Gate Bridge in the northbound direction are estimated to be transporting persons traveling from the Downtown & Vicinity./40/

U.S. 101 and I-280

The 101 and 280 freeways affect each other's capability to serve traffic demand between San Francisco and the West Bay. The capacities of U.S. 101 and I-280 are affected by the physical design of their interchange in San Francisco. In conjunction with I-380 in northern San Mateo County, the two freeways provide two alternate paths for persons traveling to San Mateo or Santa Clara Counties.

The discussion that follows emphasizes the description of the operating conditions for U.S. 101 and I-280 at the San Francisco - San Mateo County line in order to be consistent with analysis results presented previously in the Downtown Plan EIR. The discussion of operating conditions, however, is expanded to describe the effects that the configuration of the U.S. 101 / I-280 interchange has on the ability of each freeway to serve persons traveling to southern San Francisco County, San Mateo County or Santa Clara County.

At the San Mateo County line, the U.S. 101 Freeway is eight lanes wide (four lanes in each direction). North of the County line, at approximately Paul Avenue, the freeway narrows to three lanes in each direction through the I-280 interchange and north to Army Street. U.S. 101 operates at Level of Service F (V/C = 1.0) during the p.m. peak period southbound from I-80 to south of the I-280 interchange. Operating speeds in this section of the freeway are typically below 20 mph throughout the p.m. peak period. South of the interchange, the operating conditions of the southbound lanes improve to LOS D (V/C = 0.88) at the County Line, and operating speeds increase to 40 to 45 mph./43/

Poor operating conditions also exist on U.S. 101 in the northbound direction during the p.m. peak period. The backup of traffic northbound on U.S. 101 and eastbound to the Bay Bridge extends from the Bay Bridge and I-80 south to approximately Army Street.

The volume of regional traffic that I-280 can serve is constrained by the capacity of the three-lane section north of, and through, the interchange with U.S. 101. The southbound lanes of that segment of I-280 operate at Level of Service E (V/C = 0.95) during the p.m. peak period. Operating speeds on the southbound lanes north of the U.S. 101 / I-280 interchange are approximately 20 to 25 mph during the p.m. peak period./44/ West of the interchange, where I-280 widens to four through lanes plus auxiliary lanes, operating conditions on I-280 worsen because of the addition of traffic from U.S. 101. U.S. 101 operates at higher speeds and better LOS south of the U.S. 101 / I-280 interchange than north of it because there are more lanes available to serve the volume of vehicles traveling through the interchange. However, westbound I-280 does not operate better west of the interchange than it does north (and east) of it until sufficient traffic has left the freeway by approximately San Jose Avenue.

Counts of southbound traffic were taken on U.S. 101 and I-280 at the San Mateo County line during the p.m. peak hour and p.m. peak period to supplement data previously available./45/ Between 4:30 and 5:30 p.m., 7,100 and 5,200 vehicles were counted at the four-lane section of U.S. 101 and the three-lane section of I-280, respectively. Between 4:00 and 6:00 p.m., 14,800 and 9,900 vehicles were counted in the southbound direction on U.S. 101 and I-280, respectively. The peak-period volume recorded on U.S. 101 exceeded the 4:30 to 5:30 p.m. volume, because of heavy traffic from the industries within the Bayshore Corridor that enters U.S. 101 via the Third Street on-ramp between 4:00 and 4:30 p.m.

Approximately 40% of the p.m.-peak-hour and 37% of the p.m.-peak-period vehicles crossing the San Mateo County line southbound on U.S. 101 and I-280 are estimated to be originating in the Downtown & Vicinity. This is the lowest estimated contribution from the Downtown & Vicinity of vehicle trips crossing a regional screenline. U.S. 101 and I-280 serve persons traveling from a larger number of intervening employment opportunities between the Downtown & Vicinity and the San Mateo County line screenline than between the Downtown & Vicinity and the Golden Gate and Bay Bridges. There also is a larger share of all trips coming from the East Bay to travel across the San Mateo County line than there are shares of trips from other parts of the region coming to travel across the Golden Gate and Bay Bridges.

EXISTING TRANSPORTATION PLANS, POLICIES, AND PROGRAMS

The provision of access to and the level of mobility in and around the Project Area are guided by regional and local plans. Plans pertaining to or affecting the Project Area are also discussed in VI.A. Public Plans, Policies, and Permits. The following discussion of transportation components of existing plans, policies, and programs is specific to transportation modes found in the Project Area.

Regional Land Use and Transportation Issues

The Regional Transportation Plan (RTP) describes the Metropolitan Transportation Commission's (MTC) facility and service development objectives on the basis of regional land use and transportation corridors. The West Bay Corridor, on the Bay Plain between

San Francisco and Palo Alto, is the regional corridor that includes Mission Bay. Although other corridors, particularly the Transbay and Golden Gate Corridors, would influence transportation connections between downtown San Francisco and other parts of the region, improvements proposed for the West Bay Corridor would have the most direct effect on Mission Bay.

MTC's policies for the West Bay Corridor have been and continue to be shaped by the following studies:/46/

- MTC Peninsula Transit Alternatives Project (PENTAP). In 1977, MTC adopted policies developed in this study to encourage improved rail service, better service for the transit-dependent, and the preservation of facilities and options for the long-range expansion and modernization of the corridor's rail transit system. (The recommendations prepared in the Peninsula Mass Transit Study (see following) have replaced those made during PENTAP.)
- New Rail Transit Starts and Extensions Program. In February 1984, MTC adopted Resolution No. 1367, which sets forth a 16-year, 86-mile, $2.8 billion program of new rail transit starts and extensions in the region. Nine of the 19 projects identified in this program are in the West Bay Corridor.
- Peninsula Mass Transit Study. MTC, in response to Senate Concurrent Resolution No. 74 (SCR-74), (1984), conducted this study to prepare a mass transit system plan and an incremental improvement plan for the corridor.
- Peninsula Route 101 Study. Completed in March 1984, this MTC study examined the cumulative effects of growth along U.S. 101 from San Francisco to San Jose. A number of mitigation strategies were recommended, and longer-term highway, transit and land-use issues in the corridor were identified.
- I-280 Transfer Concept Program (TCP). MTC was involved in this study to select a mix of transportation projects to improve transportation in the I-280/Embarcadero corridor.

In March 1988, MTC adopted the following points of regional consensus about including CalTrain and BART extensions in the updated Regional New (Rail) Starts Plan:

1. Support for the extension of CalTrain to downtown San Francisco and agreement on the local, State and Federal funding contributions for that project.
2. Agreement on a program of BART extensions to West Pittsburg in Contra Costa County, to Dublin and Warm Springs in Alameda County, and to San Francisco International Airport in San Mateo County./47/

As the MTC policy calls for San Mateo County revenues to be used to provide a major portion of the funds required for the extension of CalTrain to downtown, the positive vote on June 7, 1988 for an increase in San Mateo County sales tax applied to funding transportation projects has directly enhanced the region's capability to implement the project. Funding commitments will be required from San Francisco and Santa Clara Counties, and from the Federal government to provide all of the funds required for construction of the extension. CalTrain service could be provided directly to downtown San Francisco approximately four years after funding for construction of the extension is secured.

Transit

Development of the Project Area would be affected by resolution of issues involving CalTrain, MUNI rail (Metro and streetcar), and MUNI bus/trolley service. How the current plans, policies and programs of San Francisco or of other governmental agencies intend to resolve the somewhat interdependent issues is described here.

CalTrain

As noted in VI.A. Public Plans, Policies and Permits, policies concerning CalTrain service are contained in three separate plans. At the regional level, two components of the Regional Transportation Plan (RTP) address service extensions. The New Rail Starts policy calls for modernization of the Peninsula Rail Service through the upgrading of facilities and equipment and the extension of CalTrain to a location in downtown San Francisco near the Transbay Transit Terminal. The Peninsula Mass Transit Study calls for the preservation of the right-of-way for extending CalTrain service into downtown San Francisco.

At the local level, the Transportation Element of the City's Master Plan ("Transportation Element") contains an implementing action that supports a regional mass transit system for the Peninsula Corridor, consistent with the Peninsula Mass Transit Study./48/ The Transportation Element, therefore, supports the preservation of the right-of-way for the possible extension of CalTrain to downtown and the extension of MUNI Metro service to the CalTrain terminal in San Francisco. In April 1987, the San Francisco Board of Supervisors passed a resolution endorsing the CalTrain extension to downtown, but supporting a temporary terminal at Seventh and Channel Streets if funding for the extension cannot be found./49/

Caltrans' Short-Range Transit Plan (SRTP) for CalTrain contains proposals for implementing service improvements consistent with MTC's RTP./50/ For the 1988-1993 period, improvements consist of the following programmed projects: acquisition and improvement of Southern Pacific stations (including the San Francisco Terminal), and construction of a new maintenance facility where some of the functions now occurring at the San Francisco Terminal would be located. Although the site for the central maintenance facility is not expected to be selected until 1988, Caltrans is proceeding with environmental review and with those aspects of preliminary engineering not affected by a specific site layout.

The extension of CalTrain service from the existing terminal at Fourth and Townsend Streets to downtown San Francisco has been included in Caltrans' SRTPs since 1983 as the prime objective to improve CalTrain's service. The implementation schedule for this project is directly dependent on the successful June 7, 1988 vote in San Mateo County. In addition, Caltrans' contract with the Southern Pacific Transportation Company to operate the CalTrain service expires on June 30, 1990 and must be renegotiated to continue the service.

MUNI Rail

The extension of MUNI rail service is discussed in two sections of MTC' RTP -- New Rail Starts and I-280 Transfer Concept Program (TCP). The New Rail Starts Policy recommends the near-term commitment of state and Federal funds to complete the Metro Turnback facility (near Steuart Street), and the allocation of planning funds to enable the analysis of other MUNI rail extensions, including two projects contained in the I-280 TCP -- extension of the Metro from the Turnback to the CalTrain Terminal at Fourth and Townsend Streets, and the development of an E-Line streetcar route along The Embarcadero linking Fort Mason to the CalTrain terminal at Fourth and Townsend Streets. That latter project was replaced by MUNI with the development of an F-Line streetcar route along The Embarcadero and Market Street linking Fort Mason to the Castro Street area.

The MUNI SRTP contains provisions to construct the Metro Turnback and breakout (portal) from subway to surface operation and to begin preliminary engineering on the extension of Metro service to the CalTrain Terminal./51/ The Metro Extension project will link the China Basin area with the Market Street subway via a portal (breakout) at approximately Steuart Street and The Embarcadero, and a surface alignment through the Rincon Point and South Beach Redevelopment Areas to the CalTrain terminal at Fourth and Townsend Streets. A connection between the Metro Extension tracks and the Northern Waterfront tracks would be built to permit movement of F-Line streetcars to and from a new rail maintenance and storage facility proposed by MUNI in the China Basin area./52/ The completion of those streetcar lines and the Metro Extension to Fourth and Townsend Streets is scheduled to occur by 1992./53/ Extension of the MUNI Metro further into the Mission Bay Project Area is considered to be an element of the Mission Bay development agreement to be reached between the City and Santa Fe Pacific Realty Corporation.

Transportation policies from the Downtown Plan incorporated into the Transportation Element of the City's Master Plan reinforce the objectives of constructing the Metro Turnback and the Metro Extension to the CalTrain terminal at Fourth and Townsend Streets. Additionally, the Downtown Plan calls for a rail rapid transit line in the Geary / Third Street corridor using a subway alignment through downtown. The Geary / Third Street corridor service would link the South Bayshore and Richmond districts via downtown. The Central Waterfront Plan also recommends light rail vehicle (LRV) service along the Third Street corridor that would connect to the E-Line (now Metro Extension) at the CalTrain Terminal./54/ Neither the RTP nor the MUNI SRTP discusses the Geary / Third Street corridor plans.

MUNI Bus / Trolley

Both the Transportation Element of the Master Plan and the MUNI SRTP contain recommendations for improving MUNI bus and trolley services. The Transportation Element calls for expanding the capacity of existing non-rail transit routes into downtown. One implementing action calls for transit agencies serving San Francisco to include in their SRTPs expansion of capacity to serve projected demand. In order to improve the speed and reliability of transit, the Downtown Plan contains an implementing action calling for assessing the desirability and feasibility of constructing north / south "shallow subways" through the downtown. Shallow subways would function as subterranean transit-only streets that could serve trolley coaches or light-rail vehicles under the most congested street segments. Third and Fourth Streets are nominated for "shallow subways" that would affect the Mission Bay Project Area./55/

MUNI's SRTP proposes a Service Expansion Plan that would increase capacity through the use of articulated vehicles and continued electrification of motorcoach (bus) lines. Service improvements would be spread throughout the MUNI system, with routes currently serving the Project Area proposed to receive proportionate service increases over time. Articulated buses could replace standard buses on the 15-THIRD, but electrification of that is not proposed within the SRTP's 1987-1992 time frame.

Streets and Highways

Plans and programs exist at both the local and regional level that affect streets in the area and the I-280 freeway. The RTP, by incorporating the I-280 TCP, calls for removal of the stub-end of I-280 and the provision of new on- and off-ramps for access to the extension of a reconstructed Embarcadero roadway. The Transportation Element of the Master Plan contains implementing actions supporting those projects. The Central Waterfront Plan, however, calls for using the land under the (then-assumed-to-be-retained) stub-end of I-280 as a parking reservoir for downtown travelers.

The Transportation Element and Central Waterfront Plan also contain policies that apply to the following streets in the Project Area:

- Third Street. The Transportation Element and the Central Waterfront Plan identify Third Street as a major surface facility providing multiple functions. In the Transportation Element, Third Street is designated throughout its length as a Transit Preferential Street (possibly containing a transit lane), a major thoroughfare for vehicular traffic, and a Preferred Commute Bike Route. The Central Waterfront Plan calls for Third Street to provide access to that area./56/

- Fourth Street. The Transportation Element of the Master Plan calls for Fourth Street to provide the multiple functions of a Transit Preferential Street and a Primary Vehicular Street throughout its length. Fourth Street between Townsend and Market Streets is considered a candidate for a transit contra-flow lane.

- King and Berry Streets. On the basis of recommendations of the I-280 TCP, King and Berry Streets were expected to be reconstructed in order to connect new I-280 on- and off-ramps at Sixth Street to the Embarcadero roadway. Berry and King Streets would each contain four lanes west of Fifth Street, but would narrow down to two lanes each when they would meet the Embarcadero roadway at Second Street. King Street is designated a Transit Preferential Street from Fourth Street (at the CalTrain terminal) to The Embarcadero./55/

After the I-280 TCP received conceptual approval by the San Francisco Board of Supervisors in November 1985, San Francisco voters in June 1986 defeated two measures calling for removal of the Embarcadero Freeway. Since then, additional planning and engineering analyses have defined King Street to be a four- to six-lane arterial connecting the I-280 on- and off-ramps and The Embarcadero roadway./57/ The Downtown Transportation Plan calls for King Street to be a Primary Vehicular Street and Transit Preferential Street.

Maritime and Related Activities

Plans and policies concerning the Port of San Francisco and industrial land uses in the Central Waterfront are relevant here as they pertain to providing rail and truck access for goods movement. The Central Waterfront Plan, which calls for the provision of adequate rail and truck access to all maritime piers, has designated truck routes on Third Street and 16th Street through the Project Area. No routes have been designated within the Project Area for use by the longer, two-trailer trucks, as allowed by the (Federal) Surface Transportation Assistance Act of 1982. The nearest designated routes are on Army Street between I-280 and the Container Terminal on Third Street (between Army Street and Cargo Way), and at the blocks surrounding I-80 at Seventh, Bryant, Eighth, and Harrison Streets (to provide access to a truck service center).

The Port of San Francisco, MTC, and the Bay Conservation and Development Commission (BCDC) all have adopted policies supporting development of Piers 48 to 64 for a marine terminal. Policies supporting the creation of a new Mission Rock Container Terminal are contained in the Port of San Francisco's Conceptual Maritime Master Planning for the Southern Waterfront and MTC / BCDC's Regional Seaport Plan, discussed in VI.A. Public Plans, Policies, and Permits, p. VI.A.18.

Pedestrian and Bicycle Facilities

The Transportation Element of the Master Plan and the Central Waterfront Plan contain provisions for developing adequate space for pedestrians where demand exists. Suggested facilities include sidewalks, malls, and other pedestrian-oriented amenities. The Transportation Element contains provisions for developing and maintaining bicycle routes for commuting and recreational purposes. In the Project Area, Third, Fourth, and Townsend Streets are designated as Class III (signed only) bikeways, and Third and Mariposa Streets as Preferred Commute Bike Routes recommended for use by experienced cyclists.

IMPACT

This section presents 1) the key assumptions and basis used to analyze the impacts of the Mission Bay Alternatives within a cumulative travel demand context, and 2) the impacts of the Alternatives. A summary of the key transportation impact conclusions is provided on p. VI.E.52. This section begins with a presentation of the different transportation facilities and services assumed to exist in the future in the Project Area, elsewhere in San Francisco, and in the corridors connecting San Francisco to the rest of the region. This section continues with a discussion of how the assumed capacity of highway and transit facilities and services is projected to affect travel demand by mode at screenlines in the year 2000, and how the analysis of travel demand in relation to capacity is being presented for build-out of Mission Bay (expected to occur in 2020). The discussion then addresses projected travel demand impacts, with cumulative conditions presented first, followed by impacts associated with the Mission Bay Alternatives. The impacts are presented in that order because regional factors and projected conditions provide the context for defining the projected Project Area impacts associated with the Mission Bay Alternatives. This section concludes with a presentation of the different kinds of mitigation measures recommended to address the projected impacts.

CONTEXT FOR THE ANALYSIS

Three different types of transportation impacts are described in this analysis of future conditions. The first type, termed "Regional", would result from the amount of travel projected to occur due to growth in employment and population throughout the Bay region outside the Downtown & Vicinity./58/ The second type of impact would result from travel projected to occur due to growth in employment and population within the Downtown & Vicinity. The third type would occur because of specific land use and local transportation features associated with the Mission Bay Alternatives.

The detailed descriptions of impacts presented in this section are preceded by explanations of the conceptual and technical perspectives guiding the analysis and definition of impacts. Those explanations of how the analyses were performed, and of how the analytic procedures used affect the derivation of conclusions, provide a context for understanding the results of the analysis.

The approach of the impact analysis recognizes that development of the Mission Bay Project Area would affect and be affected by local and regional transportation systems.

The amount and type of development in the Project Area would be influenced by ease of access between the Project Area and other parts of San Francisco and the Bay Region. By the same token, the amount, location, and type of Project Area development would influence the utility and vitality of local and regional transportation services and Levels of Service (LOS) on new and modified transportation systems within and adjacent to Mission Bay. The Project Area land uses and associated transportation features for each Alternative are identified in Chapter V. The EIR Alternatives and Approval Process, and Table V.3, p. V.20. Transportation impacts consist of changes in LOS, accessibility, mobility, and use of the Project Area transportation features, as well as of city and regional transportation systems that are described in the Transportation Setting.

Transportation impacts of the Alternatives are described for two analysis years - 2000 and 2020. While the level of certainty is higher for the impacts projected for the year 2000 than for those projected for the year 2020, the kind of impact being described has a greater effect on the level of certainty than does the analysis year. Those impacts that would be the direct result of a physical change, such as removing rail trackage for land development, can be described with a high level of certainty, regardless of when those changes would occur. Impacts described with a lower level of certainty are those that depend on making assumptions about the capacity and LOS of travel modes in the future.

The transportation impact analysis is based on the following key criteria and assumptions:

- Impacts of Mission Bay Alternatives on transportation facilities and services are analyzed in a manner consistent with the methodology used in the Downtown Plan EIR, but updated and refined as discussed in detail in Appendix E. Transportation, pp. XIV.E.1-XIV.E.12.

- For the year 2000, the transportation impact analysis expands and updates the analysis of cumulative travel demand done originally for the C-3 District in the Downtown Plan EIR to include other areas of the Downtown & Vicinity and the Mission Bay Alternatives.

- Regional and local transportation planning decisions have not been made for 2020, the Project Area's build-out year. For that reason, reliable assumptions about transportation capacity for that year cannot be made. As a result, the transportation analysis emphasizes the general level of highway and/or transit capacity increases needed to serve cumulative travel growth projected between 2000 and 2020, based on the travel demand projections of this analysis. Therefore, the definitions of projected capacity deficiencies and mitigation measures projected for build-out of the Mission Bay Alternatives are derived from cumulative travel conditions that assume no increase in capacities between 2000 and 2020.

- All Alternatives include removal of the I-280 Freeway stub and Fourth and Berry Streets off-ramp and construction of new on- and off-ramps to I-280. Alternatives A and B include relocating the CalTrain Station to Seventh and Channel Streets, while Alternative N keeps the CalTrain Station at its present location. Other on-site components of the transportation networks vary by Alternative because of differing roadway, Municipal Railway (MUNI), and rail networks.

Two types of analysis are used in this EIR to available transportation implications associated with the Mission Bay Alternatives. One type of analysis compares forecasts of future travel demand by mode against the descriptions of future travel supply (i.e., the capacity of each mode). The other type of analysis makes no numerical forecasts of travel by mode, but rather reaches conclusions about how the land use and transportation features of the Mission Bay Alternatives would compare to public policy.

IMPACT CONCLUSIONS

Impacts of the Alternatives, together with effects associated with growth or changes in the rest of the City and region, have been analyzed for two future years. The analyses of regional impacts for those two years, 2000 and 2020, are slightly different in orientation and affect the types of conclusions drawn about future conditions. This is a result of the differing levels of information available on regional transportation systems for those two time horizons. However, conclusions from the analyses of Project Area impacts are parallel in approach and presentation for both years.

The first analysis year, 2000, is a frequently used benchmark for long-range planning, including planning for regional transportation improvements. The regional analysis for this interim year therefore incorporates certain types of transportation improvements expected to occur by 2000, based on existing policies and plans published by local and regional transportation agencies.

The second year, 2020, was selected to ensure consistent analysis in the EIR of the Mission Bay Alternatives at build-out. However, no transportation plans exist for that distant timeframe. As a result, the travel projections in the 2020 analysis are less certain than those for the year 2000, and do not incorporate any assumptions of further transportation improvements beyond 2000. The 2020 impact analyses, therefore, do not present a realistic scenario of transportation conditions; instead, the impact results are used to identify the types and magnitudes transportation improvements that would accommodate projected travel demand, and which should be considered in planning for regional transportation systems beyond 2000. A detailed presentation of all mitigation measures for both analysis years is contained in the Mitigation section.

The analysis of cumulative impacts on highway and transit systems and of future conditions affecting local transportation networks within and near the Project Area provides conclusions about the most significant differences or similarities among the Mission Bay Alternatives. Those conclusions are presented below in a format designed to present clearly the most important conclusions of the impact analyses.

2000

- Development in the Project Area by 2000 under Alternatives A and B would require relocation of the CalTrain terminal to Seventh and Channel Streets.
- Roadway improvements under the Alternatives and implementation of the I-280 Transfer Concept Program (TCP) would provide acceptable LOS (Level D or above) at all intersections in the Project Area, except Third Street and King Boulevard in Alternative N; additional travel and turn lanes would be required to mitigate impacts at that intersection. Less than 10% of all traffic at these intersections would be attributable to Project Area travel. Intersections at freeway accesses, however, would generally operate at poor LOS.
- Expanded MUNI routes and service proposed for the Project Area would operate at acceptable LOS, except the 47-VAN NESS. Additional buses would be required for the portion of this route between Mission Bay and the Civic Center.
- Alternatives A and B in 2000 would result in a daily excess parking demand, which could be accommodated if additional spaces were provided in parking lots on undeveloped sites within the Project Area. This would, however, discourage use of public transit.
- Development under the Alternatives and implementation of I-280 TCP improvements would require access to businesses via the Belt Railroad to be rerouted. However, service to the Northern Container Terminal at Islais Creek via the 16th Street lead and Illinois Street tracks running in the Project would remain operational in 2000.
- The Mission Bay Alternatives would be statistically indistinguishable from each other with respect to their contribution to cumulative travel at the City and regional screenlines, except for the South Bay screenline. Growth in employment and population outside the Project Area, in the rest of the Downtown & Vicinity and region, would contribute the predominant amounts of new travelers crossing screenlines. The very small shares of cumulative travel projected to be generated in the Project Area are first discussed on p. VI.E.83.
- Under all Alternatives, cumulative vehicle travel demand would exceed roadway capacity of the Bay Bridge during the 4:00 to 6:00 p.m. peak period. Duration of congestion would be about 4.5 hours on the Bay Bridge. Those

impacts are projected even with the assumption that future travelers from the Downtown & Vicinity would shift to transit and ridesharing. Based on that assumption, the forecasts attribute excess vehicle demand to travelers from elsewhere who would be bypassing the Downtown & Vicinity or traveling through it. Those travelers would not have the same types of transit or ridesharing alternatives as would travelers from the Downtown & Vicinity. In response to the projected freeway constraints, those regional travelers could change their routes or times of travel; however, alternate routes such as the Hayward - San Mateo Bridge, would also be more congested in 2000.

- Travelers from the Downtown & Vicinity (including Mission Bay) would shift in substantial percentages from use of private vehicles to transit and ridesharing by 2000 in response to the capacity constraints on the Golden Gate and Bay Bridges.

  Travel from the Downtown & Vicinity to the North Bay in private vehicles would decrease by about 32% and transit travel would increase by about 41% on Golden Gate Transit. Vehicle travel to the East Bay from the Downtown & Vicinity would decrease by approximately 30% and increase travel on BART by about 26%. These mode shifts would result in crowded conditions on Golden Gate and AC Transit, and particularly on BART. Each would require additional transit vehicles or expanded duration of peak service to improve LOS to acceptable passenger loadings.

- It is possible that projected congestion levels on sections of the regional transportation system serving San Francisco would result in changes in travel patterns besides changes in routes and time of travel. It is possible that people would change their place of residence (and therefore travel access) to be closer to work. On the other hand, transportation constraints could also limit employment growth below the levels assumed in this analysis.

- Some capacity increases on transit systems and ridesharing facilities on freeways assumed in the analysis would be available to accommodate a shift by travelers from the Downtown & Vicinity from autos to transit. To achieve the projected mode shifts in the East Bay and North Bay corridors,it is assumed that freeway rideshare lanes and increased transit capacity would make travel times and comfort on transit competitive with single-occupant vehicles.

- Relocation of the CalTrain terminal to Seventh and Channel Streets, proposed with Alternatives A and B, would reduce CalTrain's ridership (compared to the Fourth / Townsend station location in Alternative N). The extent to which CalTrain's ridership would be reduced by the new location of the station has been variously estimated to range from 5% to 22%./59/

2020

- By build-out under all Alternatives, heavy cumulative traffic volumes along King Boulevard to access ramps onto I-280 would require six travel lanes (three in each direction), two left turn lanes at Third Street, and one left turn at Fourth Street to maintain acceptable LOS at those intersections. Similarly, the intersection of Third and Mariposa Streets would require improvements to provide right turn lanes (on Third) and left turn lanes (on Mariposa) to provide acceptable levels of access to the I-280 Mariposa Street on-ramps. Intersections at freeway access points would operate at poor LOS.

- Additional MUNI capacity beyond the levels proposed in Alternatives A and B would be required to provide acceptable ridership conditions. Demand on the 47-VAN NESS, however, would reach levels that would justify replacement of the route with light rail service between the Project Area and the Civic Center area.

- Parking supply deficits would be high with Alternatives A and B, probably requiring separate parking structures to avoid demand from spilling over into residential areas. Accommodating those additional vehicles, however, would create localized congestion in the Project Area and contribute to cumulative congestion projected on the regional freeway system serving San Francisco. Other measures, such as a Transportation Systems Management (TSM) Program, are available to reduce vehicle travel demand, therefore reducing parking demand.

- Build-out of the Alternatives would result in removal of the 16th Street lead track in the Project Area. This would result in the need to reroute the Belt Railroad to serve the Northern Waterfront, and provide a new rail connection to serve the Northern Container Terminal at Islais Creek.

- By 2020, differences between the Mission Bay Alternatives would be statistically distinguishable with respect to the amount of cumulative travel across screenlines. However, trips from the Project Area under any Alternative would continue to be a small proportion of total cumulative travel. Alternative B would generate the smallest number of outbound trips, as it would provide the most housing and the least employment within the Downtown & Vicinity (including the Project Area). Alternatives A and N would generate the greatest numbers of outbound trips, because those Alternatives would provide the most employment within the Project Area and the Downtown & Vicinity, and less housing than contained in Alternative B.

- By 2000, the capacity of all modes to the North Bay and East Bay would be saturated. The estimated impacts for 2020 underscore the need to engage in advance planning for regional transportation improvements to respond to travel demand beyond 2000. Without further mitigation measures beyond 2000, highway congestion at all three screenlines during the p.m. commute are estimated as follows: about 2.5 hours on the Golden Gate Bridge; over five hours on the Bay Bridge, and over three hours on U.S. 101 to the South Bay. Together with a.m. commute conditions, which would be similar (but in the opposite direction), commute travel would extend for a substantial length of time on the freeways serving San Francisco.

- Travel demand on the Golden Gate Bridge and its approaches would require increased transit and ridesharing. Beyond high-occupancy vehicles (HOV) lanes on its San Francisco approaches, a second deck on the Golden Gate Bridge is identified as a way of expanding capacity that could give priority to new HOV or light-rail transit facilities.

- Travel demand would continue to be heaviest at the East Bay screenline. Possible improvements to expand Transbay capacity, among several ideas identified in the Mitigation section, include: reconsideration of the concept of a Southern Crossing to the East Bay from San Francisco or San Mateo County; expanding the Hayward - San Mateo Bridge; and building another BART transbay tube.

- Estimated travel demand to the South Bay would justify consideration of extending CalTrain to downtown, or extending BART and MUNI Metro service.
- Estimated demand for additional MUNI service in the Downtown & Vicinity would require deploying additional vehicles. In addition, demand would be sufficient to support light rail service along Geary Boulevard and to the Bayshore Corridor, and expanding service to the Northwest and Southeast MUNI screenlines, respectively.

REGIONAL AND CITYWIDE TRANSPORTATION FACILITIES AND SERVICES

Future access to and within the Downtown & Vicinity will be affected by investments (improvements) made on regional and Project Area transportation systems, beyond the existing facilities and services described in the Transportation Setting. The screenlines used to define travel corridors also are the same as those presented in the Transportation Setting, p. VI.E.32.

2000

The transportation facilities and services assumed to exist by the year 2000 in the Downtown & Vicinity or in travel corridors serving San Francisco are described below. The general criteria used to determine what improvements have a high probability of being in place by the year 2000 are:

- facilities or services that are included in an adopted plan of a public agency having jurisdictional responsibility for the improvement. (This would include the Five-Year Short Range Transit Plans updated annually by transit agencies.)
- facilities or services that are identified as an improvement proposal in the Regional Transportation Plan (RTP) for the Nine-County San Francisco Bay Area, updated annually by MTC.
- the existence of a mechanism to finance implementation of the facility or service. (This criteria would be met by those projects identified for implementation as part of local sales tax programs or included in MTC's most recent five-year Regional Transportation Improvement Program.)

Facilities and services that meet those conditions are considered to be part of the "reasonably assured capacity" available in 2000. Projects in the conceptual stage, or highly controversial projects with known political opposition, were not assumed to be part of the year-2000 transportation systems analyzed in this EIR. A more extensive explanation of which regional facilities and services were assumed to exist is presented in Appendix E. p. XIV.E.22

Regional Highways

As no additional highway capacity is assumed to be provided to San Francisco, the most significant additions to the regional freeway system that would affect San Francisco travelers would be the provision of new or extended lanes for high-occupancy vehicles (HOV). The following highway facilities, which would have a direct effect on travel to or from San Francisco, are assumed to be in operation by the year-2000, based on the criteria listed above:

- U.S. 101 would be widened to eight lanes in Marin County, with the new lanes designated for HOVs during peak periods. The HOV lanes would be continuous between the Richardson Bay Bridge and Novato.
- I-80 would be widened to provide eastbound HOV lanes from the Bay Bridge to about Ashby Avenue in Berkeley, westbound HOV lanes from Rodeo to Richmond, and additional auxiliary lanes.
- A reversible facility for HOVs, designed to serve a.m. westbound and p.m. eastbound travel, would be built in Oakland on I-580 from the I-580/I-880/I-80 distribution structure east to the Route 24 interchange.
- U.S. 101 would be widened by one lane in each direction from San Carlos to the San Mateo / Santa Clara County line, providing a total of eight lanes from Santa Clara County to San Francisco.

Regional and Citywide Transit Facilities

The assumptions about regional transit service that have the most direct effect on the travel forecasts in this EIR are: 1) the increases in capacity anticipated across all screenlines, and 2) the relocation of the CalTrain terminal in San Francisco to Seventh and Channel Streets with Alternatives A and B. The increases in transit and HOV capacity are used to project the magnitudes of travel in private vehicles, on transit, and HOVs. The proposed relocation of the CalTrain terminal would affect travel across the South Bay screenline (see discussion beginning on p. VI.E.101).

The following transit facilities and services, which would have a direct effect on travel to or from San Francisco, are assumed to be in operation by 2000, based on the criteria stated above, and on information supplied by the transit operators:

- An increase in transbay BART train frequencies, providing about 65% more passenger-carrying capacity during the peak period and peak hour than was provided in 1985.

- The addition of 150 new "C" cars on BART.
- Construct a BART turnback facility, and extend service to a new station and maintenance yard in Colma, to enable more rapid turnaround and thus increased BART capacity.
- An unchanged number of peak-direction, peak-period trains on the CalTrain line serving San Francisco from that provided in 1985./60/
- A near doubling of SamTrans bus trips (and capacity) serving the Downtown & Vicinity.
- A slight increase (8%) in AC Transit's transbay bus trips (and capacity).
- Increases in Golden Gate Transit's ferry trips (and capacity) (39%) and transbay bus trips (and capacity) (29%) during the peak period.
- Construction of the MUNI Metro Turnback Project and extension of MUNI Metro to the existing San Francisco CalTrain terminal in Alternative N, or to the relocated terminal at Seventh and Channel Streets in Alternatives A and B. This would allow an increase in subway capacity of about 50% over 1985 levels.
- Addition of 50 Metro vehicles to MUNI's fleet, and extension of MUNI's J-Line and of (historic) streetcar service along The Embarcadero, between Market Street and Fisherman's Wharf.
- Increase MUNI peak-period passenger-carrying capacity by the following percentages over 1985 levels: Northeast Screenline, 11%; Northwest Screenline, 11%; Southwest Screenline, 21%; and Southeast Screenline, 5%.

Build-Out/2020

For the analysis of full build-out of the Project Area, regional and citywide transportation facilities and services assumed to exist in 2000 are assumed to remain unchanged in 2020. The year 2020 is over 30 years distant. This requires a reorientation from the way transportation conditions are defined for the year 2000, because there are no adopted transportation plans on which to base assumptions about transportation capacity for that (later) horizon year. While transportation facilities and services are likely to change between 2000 and 2020, those changes were deemed too unspecified to rely upon in projecting cumulative transportation impacts. Thus, the 2020 cumulative travel impact analysis does not assume any further transportation facility or service improvements beyond the year 2000. As a result, analysis of the year 2020 cumulative travel demand projections are for the purposes of: 1) describing the types and magnitudes of additional capacities required to serve projected cumulative travel demands at build-out of the Mission Bay Alternatives, and 2) identifying transportation development opportunities that could be preserved or precluded by build-out of the Mission Bay Alternatives. These two sets of conclusions are used to recommend possible mitigation measures (see Mitigation, pp. VI.E.198). Measures for project-related impacts are more specific than measures addressing regional impacts; those cumulative mitigation measures are intended to illustrate the magnitude of additional transportation capacity needed, which also could be achieved in a manner other than the conceptual approaches that are presented in this EIR.

The general assumption of maintaining the same level of regional transportation facilities and services in both years 2020 and 2000 applies only to city and/or regional facilities and services that are not specified transportation features of the Mission Bay Alternatives. Proposed changes in Project Area transportation facilities and services in 2000 and 2020 among the Alternatives are described in the following pages.

PROJECT-LEVEL TRANSPORTATION FACILITIES AND SERVICES

Summary descriptions of land use and transportation features of the Mission Bay Alternatives analyzed in this EIR were presented in V. The EIR Alternatives and Approval Process. Additional details that help the reader understand the definition of transportation impacts are provided in the following paragraphs.

Types and amounts of different land uses assumed to occur in the Project Area in 2000 and build-out/2020 vary by Alternative and cause some differences among transportation facilities and services in or adjacent to the Project Area assumed in each Alternative. The following paragraphs describe how and why the roadway networks, transit facilities and services, maritime activities and related facilities, and rail freight facilities serving the Project Area differ by year among the Alternatives.

The transportation features of the Alternatives are described briefly in the following pages to clarify the difference between causes (the features of the Mission Bay Alternatives) and their effects (the impacts resulting from implementation of those features). Some transportation features, such as the orientation of the street grids in the Project Area, are direct parts of each Alternative. However, related features, such as the numbers of lanes at intersections, are considered subject to final definition generally via mitigation (after the projections of future travel demand are compared to future capacity during the analysis of impacts).

Roadway Networks

The three Alternatives would contain both similar and different roadway features. Similar roadway features would occur both within and adjacent to the Project Area because of decisions already made by the City and County of San Francisco, Caltrans and MTC. Some of the roadway features of the Alternatives would be similar because alignments of streets and (likely) directionality of street operations are controlled by existing and planned patterns of development in the South-of-Market area and other Nearby Areas.

The three Alternatives would share the following freeway and street characteristics of the roadway networks within or adjacent to the Project Area:

- Construction of new ramps to and from I-280 at Sixth and King Streets and demolition of the existing elevated section of the I-280 freeway between approximately Sixth Street and I-280's current stub at Third and Berry Streets (the tear-down or pull-back project included in the I-280 Transfer Concept Project). Removal of the I-280 mainline stub north of China Basin Channel would also eliminate the existing off-ramp at Fourth and Berry Streets. (Neither I-280's existing ramps to and from Sixth and Brannan Streets nor the I-280 viaduct south of approximately China Basin Channel are proposed to be modified.)

- Direction of traffic flows and number of lanes on all streets, except Seventh Street, surrounding the Project Area. (The different assumptions for Seventh Street are presented on the following page.)

- Alignment of all streets in the Project Area north of China Basin Channel, to follow the existing South-of-Market grid.

- Number of lanes and direction of traffic flows on the Third and Fourth Street Bridges over China Basin Channel.

- Streets within the Project Area containing four travel lanes would be Third, 16th, Fourth (north of China Basin Channel), Townsend, Owens and King, because those streets would continue to carry traffic to and from the Project Area, the Downtown & Vicinity, and other areas of San Francisco. All other streets within the Project Area would contain two travel lanes (one in each direction).

- All streets would contain parking lanes, although parking on major streets would be prohibited during peak travel hours.

- Berry Street would dead-end, west of Sixth Street.

Differences among the roadway networks associated with the Mission Bay Alternatives are as follows (see Figures VI.E.11-VI.E.13, p. VI.E.141-VI.E.143):

- South of China Basin Channel, the street grid would follow the Third Street grid with Alternative A, the South-of-Market grid with Alternative B, and a mixed (hybrid) grid with Alternative N.

- Owens Street would be extended north of China Basin Channel via a new bridge in Alternatives A and B, but not in Alternative N.

- Seventh Street north of 16th Street would be restriped to contain four travel lanes in Alternatives A and B, but would continue to have two travel lanes in Alternative N.

- Truck-weight, parking and time-of-use restrictions would not apply on any streets within the Project Area in Alternative N. In Alternatives A and B, truck restrictions would apply to all streets, except Fourth (north of Third), Mission Rock, Owens, Iowa, King, Townsend, Mariposa, China Basin, and 16th Streets.

- Staging development differently within the Project Area for the different Alternatives means that different segments of internal streets (those not carrying through traffic) would be built to provide local access to the portions of the Alternatives projected to be developed by the year 2000.

Transit Facilities and Services

Transit components of the Mission Bay Alternatives would differ because of the assumed location of the CalTrain station serving the Project Area, and extensions of MUNI Metro and bus services into the Project Area. MUNI Metro and bus service extensions would vary because of the location and function of the CalTrain station and differences among the Alternatives in the types and intensities of development within the Project Area.

CalTrain (Peninsula Commute Service)

For this EIR, the most conservative assumption about the location of CalTrain's San Francisco terminal has been made; that is, there would be no extension of CalTrain into downtown San Francisco. This decision was made because the analysis for this EIR began before MTC voted in March 1988 to support a regional rail program that includes the CalTrain extension, and before voters in San Mateo County passed a referendum measure (Measure C) in June 1988 to provide a major part of the funding required for the CalTrain extension. Instead, for Alternatives A and B, the CalTrain terminal is assumed to be relocated southwest to Seventh and Channel Streets, while with Alternative N the terminal would remain at Fourth and Townsend Streets. This assumption is consistent with the intent of Resolution No. 242-87, adopted by the Board of Supervisors of the City and County of San Francisco, and permits a conservative analysis showing greater roadway impacts when comparing the effects on CalTrain between Alternatives A and B on one hand and Alternative N on the other./61/ However, the implications for retaining CalTrain service at Fourth and Townsend Streets in Alternatives A and B, are evaluated in VII. Variations on the Alternatives, Variant 9, p. VII.51.

Although considerable planning and political efforts have been devoted to extending CalTrain service north into the core of downtown San Francisco, until March 1988 the high cost associated with such an extension had created a significant obstacle to achieving consensus among Bay Area and state political leaders in support of that project. While the controversy that existed about upgrading CalTrain vs. extending BART into central and southern San Mateo County has abated, securing funding for the CalTrain extension now requires commitment of funds by San Francisco and Santa Clara Counties, and the Federal government. (See p. VI.E.191 for more discussion.)

As a direct result of this assumption on the location of the San Francisco terminal, no increase in peak-period, peak-direction CalTrain service is assumed for the impact analysis. This assumption is based on planning documents prepared for CalTrain that identify the need for additional peak-period, peak-direction trains to be in service when CalTrain service is extended into downtown San Francisco./50/

MUNI Metro

MUNI Metro (light rail transit) service would be extended to the CalTrain station by 2000 in the Mission Bay Project Area with all the Alternatives. All Alternatives would include construction of two at-grade tracks extending south and west from the Metro breakout near Howard Street along The Embarcadero and within the median of a widened King Boulevard. With Alternative N, MUNI Metro service would be provided only as far west as the existing CalTrain terminal at Fourth and Townsend Streets. That project is included in MUNI's 1987-1992 Capital Improvement Program, with funding allocated from the I-280 Transfer Concept Program./62/

For Alternatives A and B, MUNI Metro service would be extended further west and south beyond Fourth and King Streets to the relocated CalTrain station at Seventh and Channel Streets. MUNI anticipates that funding for the Metro extension would be provided by the Mission Bay project sponsor./62/ Although this financing issue remains to be resolved in the development agreement between the City and project sponsor, construction of the MUNI Metro extension to Seventh and Channel Streets is assumed as a prerequisite for viable CalTrain service./63/

In Alternatives A and B, MUNI Metro stations within the Project Area would be on King Street west of Fourth Street, on King Street west of Sixth Street, and at the (relocated) CalTrain terminal. In Alternative N, a MUNI Metro station would be built on King Street west of Fourth Street, to serve the CalTrain terminal./64/ In all Alternatives, a small dispatching yard, consisting of approximately three to four tracks 800 to 1,000 feet long, would be built at the terminus of the MUNI Metro extension. That yard would be used to store and dispatch MUNI Metro trains as needed, with special attention to serving CalTrain's schedule of commuter train arrivals and departures./65/

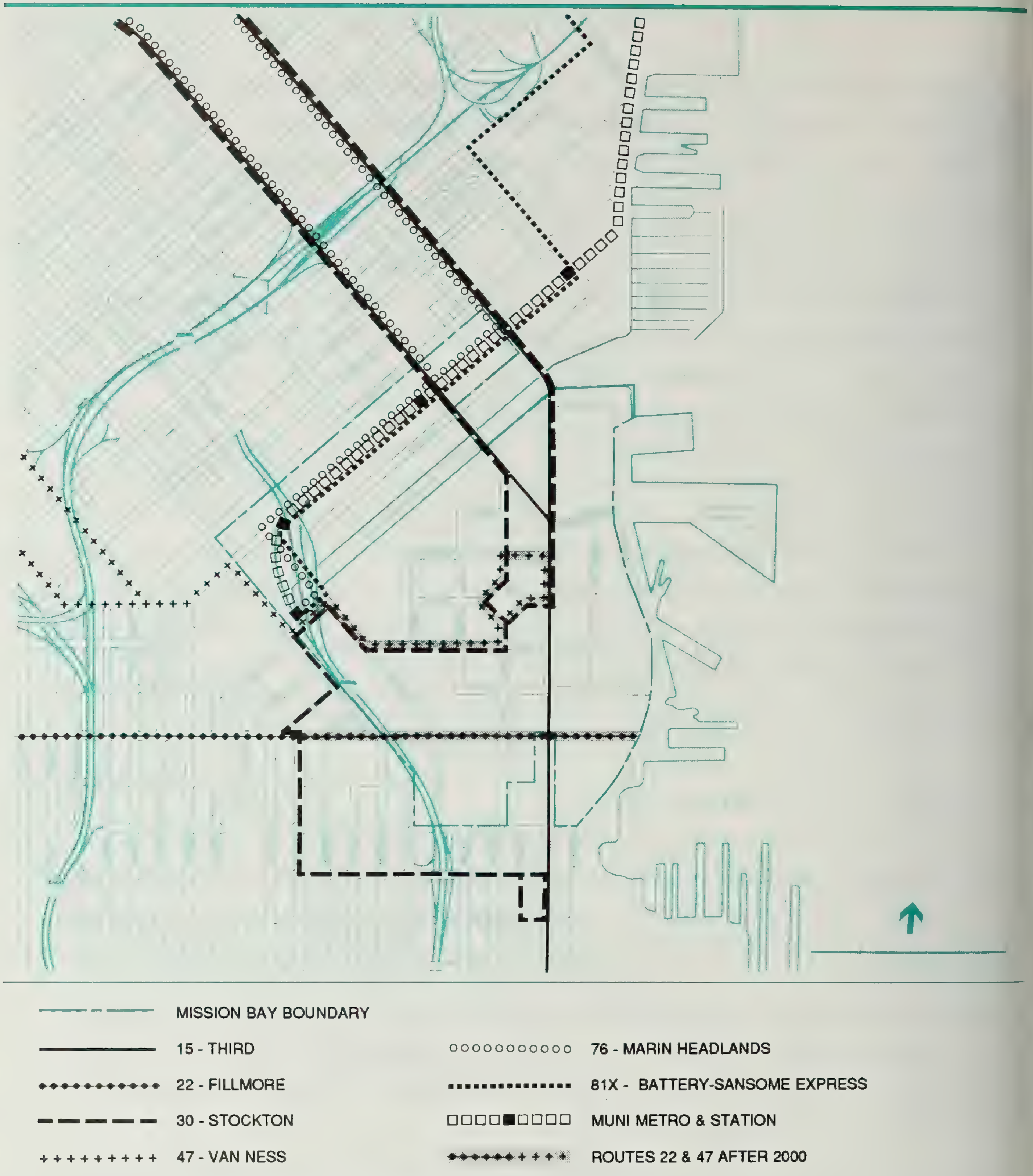
While continuing refinements in schedules are expected to reflect on-going analyses of ridership and financial trends, MUNI Metro's frequencies of service to the Mission Bay Project Area are currently planned to be defined differently for peak and off-peak periods. During peak periods, 50% of MUNI Metro trains operating through the Market Street subway would serve Mission Bay Project Area stations, so that the frequency of service would be related to expected travel demand patterns./64/ The remaining 50% of peak-period MUNI Metro trains would be returned to the Market Street Subway at the MUNI Metro Turnback, where a four-track stub terminus would be built between Harrison and Bryant Streets. During off-peak periods, when service frequencies are lower than during commute hours, all MUNI Metro trains would continue on to the Project Area.

MUNI Bus Routes

With Alternative N, MUNI bus routings to the Project Area are assumed to remain the same as in 1988. The 15-THIRD STREET would not be changed with any of the Alternatives. See Figure VI.E.4, p. VI.E.15 for a map of MUNI routes in the Project Area.

MUNI service extensions and re-routings would occur with Alternatives A and B to serve the relocated CalTrain terminal and mixed-use development of the Project Area. Figures VI.E.9 and VI.E.10 show the MUNI service changes and extensions proposed for Alternatives A and B, respectively.

MUNI's 30-STOCKTON, 76-MARIN HEADLANDS and 81X-BATTERY-SANSOME EXPRESS routes are proposed to be extended west and south by 2000 to serve the CalTrain terminal. The 30-STOCKTON is also proposed to be extended south and west beyond Mission Bay to serve eastern Potrero Hill. The 47-VAN NESS is proposed to be rerouted from its current Potrero Street alignment to connect the Civic Center/Van Ness area with Mission Bay and Showplace Square via Division Street. The modified 47-VAN

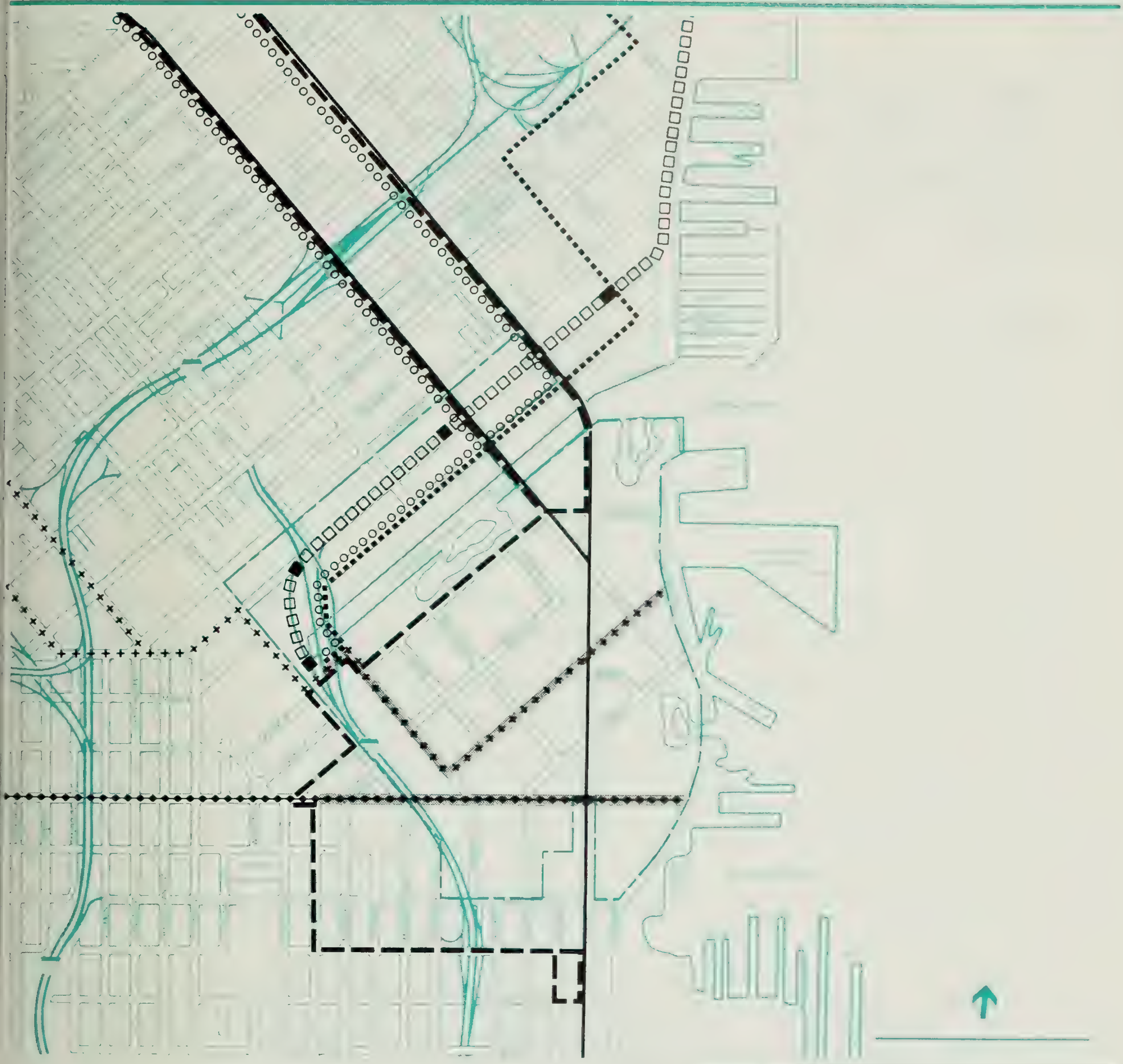

MISSION BAY BOUNDARY
15 - THIRD
22 - FILLMORE
30 - STOCKTON
47 - VAN NESS
76 - MARIN HEADLANDS
81X - BATTERY-SANSOME EXPRESS
MUNI METRO & STATION
ROUTES 22 & 47 AFTER 2000

NOTE: 2000 and 2020 services identical, except as indicated for routes 22 and 47.

Mission Bay

SOURCE: S.F. Municipal Railway
and Barton-Aschman Associates, Inc.

FIGURE VI.E.9
ALTERNATIVE A MUNI SERVICES –
2000 AND BUILD-OUT/2020



— — —	MISSION BAY BOUNDARY		
————	15 - THIRD	oooooooooooo	76 - MARIN HEADLANDS
◆◆◆◆◆◆◆◆◆◆◆	22 - FILLMORE	▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪	81X - BATTERY-SANSOME EXPRESS
— — — —	30 - STOCKTON	□□□□■□□□□	MUNI METRO & STATION
+ + + + + + + + +	47 - VAN NESS	◆◆◆◆◆◆+ + + +	ROUTES 22 & 47 AFTER 2000

NOTE: 2000 and 2020 services identical, except as indicated for routes 22 and 47.

Mission Bay

OURCE: S.F. Municipal Railway
and Barton-Aschman Associates, Inc.

FIGURE VI.E.10
ALTERNATIVE B MUNI SERVICES –
2000 AND BUILD-OUT/2020

NESS would serve the CalTrain terminal at Seventh and Channel Streets and would traverse the Project Area south of China Basin Channel. The 22-FILLMORE is proposed to be relocated from the Potrero Hill area (proposed to be served by the 30-STOCKTON), and extended east into the Project Area via 16th Street to terminate at China Basin Street.

With Alternatives A and B, the 42-DOWNTOWN LOOP would not be extended south and west toward the relocated CalTrain terminal at Seventh and Channel Streets, but is proposed instead to be realigned north to Bryant and Harrison Streets to serve the South of Market Area. The 32-EMBARCADERO and 80X-GATEWAY EXPRESS are proposed to be discontinued, to be replaced by MUNI Metro and a realigned 81X-BATTERY/SANSOME EXPRESS.

With the exceptions noted below, all MUNI Metro and bus service changes would occur by the year 2000, because the majority of MUNI's service changes are predicated on the relocation of the CalTrain terminal from Fourth and Townsend Streets to Seventh and Channel Streets in Alternatives A and B, which would have occurred by then. The following service extensions are assumed to occur between the years 2000 and 2020, when additional secondary streets are to be built or when additional development would make service extensions feasible and effective:

- Extension of the 22-FILLMORE along 16th Street from Connecticut Street east to China Basin Street with both Alternatives A and B.
- Extension of the 47-VAN NESS south and east from the CalTrain station along Alameda Street to a terminal at Third and (new) Division Streets with Alternative A, or south along Owens Street and then east to a terminal on China Basin Street at (new) Daggett Street with Alternative B.

All of the MUNI route extensions and changes discussed above are based on service proposals prepared by the S.F. Public Utilities Commission and MUNI to identify likely service concepts and to provide a basis for developing ridership forecasts. These are not intended to be MUNI's final routing plans. Additional assessment is to be done as MUNI prepares actual routing and scheduling plans, which ultimately must be approved by the S.F. Public Utilities Commission and Board of Supervisors.

For all Alternatives, passenger-carrying capacities of MUNI bus routes serving the Project Area would increase, because standard-size buses and trolley coaches are proposed to be replaced by larger-capacity articulated buses and trolley coaches on all routes serving the CalTrain terminal, either at Fourth and Townsend Streets (Alternative N) or Seventh and Channel Streets (Alternatives A and B). Articulated buses are also assumed to replace standard buses on the 15-THIRD STREET in all Alternatives. Articulated trolley coaches would be deployed on the 22-FILLMORE and the 47-VAN NESS, extended to serve Mission Bay. For the impact analysis, headways on all lines to serve the Project Area are assumed to be as in current schedules, with operating schedules to be refined by MUNI's future service plans.

Maritime Facilities and Services

Future regional factors and Project Area land uses affecting the piers and backlands adjacent to Mission Bay are described in VI.B. Land Use, Business Activity, and Employment, p. VI.B.67, p. VI.B.76, and pp. VI.B.101-VI.B.104. The aspects of future utilization of each pier most relevant to the analysis of future rail and freight access and viability of maritime activities are described in this section.

In the area adjacent to the Project Area, the lease on Pier 52 -- Santa Fe's railway barge pier -- will expire in the year 2000, but new or different uses of that facility are not anticipated. Pier 64, which has been abandoned, is assumed to be removed. Pier 48 (the Newsprint Terminal), Pier 50 (the Mission Rock Terminal) and Pier 54 (which includes ship-repair activities) are assumed to continue to be used for their current purposes, although the floating dry dock at Pier 50 operates on a five-year lease. No major new maritime facilities or services requiring rail or truck access are assumed to be built in this portion of the Port by the year 2000. Existing pier, wharf, and backlands facilities currently in use are expected to be maintained for similar maritime uses and with similar transportation requirements.

South of the Project Area, existing maritime activities and related land uses are expected to continue along the waterfront of the Central Basin. Further south, the Port of San Francisco is expected to focus and consolidate freight shipping activities at the North and South Terminals (Piers 80 and 94 to 96). Maritime shipping of general cargo, container, and intermodal transfer freight is anticipated to result in continued need for rail and truck access to the Port's container terminals at Islais Creek./66/

All maritime facilities and services assumed to be present in the year 2000 are also assumed for the year 2020. Between 2000 and 2020, the Port is expected to continue to modernize the North and South Terminals, in response to changing container, rail and general cargo needs. Development of the Mission Rock Terminal at Pier 50 is not assumed to occur by 2020 (see discussion in VI.B. Land Use, Business Activity, and Employment, pp. VI.B.101-104 and VI.B.115-VI.B.117).

Rail Freight Facilities and Services

Rail freight operations serving industrial and maritime activities in and around the Project Area are assumed to continue, using line-haul service between San Francisco and San Jose in the Peninsula Corridor. Freight car gathering and classification are projected to continue at the Bayshore (Brisbane) and San Jose Yards. South of San Francisco, no major changes in rail freight facilities or activities are assumed./67/ Railroad mainline and lead tracks in the Project Area in 1987 are assumed to remain in 2000 and 2020, unless the rail right-of-way is replaced by a different land use. Changes in lead tracks that have occurred since 1985 are discussed on p. VI.E.22.

With all Alternatives, the main SP Mission Bay receiving yard, the Western Pacific (WP) tunnel under Potrero Hill south of 16th Street, the Berry Street / Lefty O'Doul (Third Street) Bridge tracks, the Division Street tracks and Pier 52 (former SF Ferry Pier) would be abandoned by the year 2000. For the explanation of this projection, see p. VI.E.20-VI.E.25.

Alternative N

With Alternative N, the following lead tracks are expected to remain in service within and adjacent to the Project Area in 2000 and 2020. See Figures VI.E.5 and VI.E.6, p. VI.E.21 and p. VI.E.23 for maps of the existing rail freight tracks and facilities in and near the Project Area.

- Belt Railroad: Implementation of the I-280 TCP could require the relocation of the Belt Railroad, providing rail access to the Northern Waterfront from King Street. The Belt Railroad lead track would be located on a travel lane on King Boulevard between the mainline (at Sixth Street) and The Embarcadero, on a separate track than that used for the MUNI Metro. The utilization rate for the Belt Railroad lead track is expected to be so low (and to be restricted to hours outside the peak travel period) that this concept would not affect traffic operations on King Boulevard.

- ATSF-SP, from the SP mainline northeast across 16th Street on SP tracks to Illinois Street at El Dorado Street, then on ATSF tracks on Illinois Street north to Pier 48 and south on ATSF-SP tracks to the North Container Terminal at Islais Creek.

- Former Western Pacific, from the SP mainline via the SP lead at 16th Street west to a line running north to just south of Division Street, and from there on one branch west to Harrison Street, then south on Harrison Street to 22nd Street; and on another branch, west to Florida Street, and then south on Florida Street to 18th Street.

- ATSF's Indiana Street industrial lead track connects to SP mainline via the SP lead near Seventh and 16th Streets west of the mainline, then proceeds south to Mariposa Street, along Indiana Street beneath I-280 to 25th Street, and then easterly along 25th Street to connect via a southbound turn into the Illinois Street track. The Indiana lead track is available as an alternative to the Illinois Street lead for rail shipments from the mainline to and from the Port of San Francisco North Terminal. The Indiana lead track has not been used since 1985.

To meet expected demand for rail freight service in or near the Project Area, all of the existing lead tracks are assumed to still be in service with Alternative N by the year 2000. The only track that may be abandoned and converted to other uses would be the Indiana Street track, which is not currently used. The other tracks are assumed to continue to allow rail freight shipments to and from businesses along those leads.

Rail yards in the Project Area that are assumed to exist with Alternative N and be in serviceable condition are the Fourth & Townsend Street passenger terminal yard and the SP-Belt Line interchange yard. The SF-SP Interchange Yard on Illinois Street next to the Kaiser Sand and Gravel Plant is not assumed to be in use through the year 2000 because rail barge service to San Francisco at Pier 52 is not expected to resume.

All rail freight facilities and services assumed to exist in Alternative N in the year 2000 are also assumed to exist in the year 2020. Rail freight facilities and services outside the Project Area, particularly to the south, are assumed to be similar for all three Alternatives in both 2000 and 2020, unless indicated otherwise in the following paragraphs for Alternatives A and B.

Alternatives A and B

By the year 2000, the development of Alternatives A and B would include the following changes to the railroad network in the Project Area and its vicinity. Figures VI.E.14 and VI.E.15, pp. VI.E.155 and VI.E.157 show the following future trackage with Alternatives A and B.

- The Peninsula mainline would be shortened, with the new terminus at Seventh and Hooper Streets, just south of the relocated CalTrain terminal at Seventh and Channel Streets. No rail leads from the mainline would extend north from the new CalTrain station. As currently proposed, the new CalTrain station would contain up to six platform tracks, with up to seven storage tracks just south of 16th Street./68/

- Since removal of the King Street to The Embarcadero lead would terminate rail freight service to the Belt Line's Northern Waterfront sector, Alternatives A and B would provide a means to continue this (rail freight) service over China Basin Channel across the Third Street Bridge. That means is described in further detail on p. VI.E.153.

Industrial lead tracks connecting the mainline to the Port's North Container Terminal at Islais Creek via Illinois Street at 16th Street would remain in service in 2000. Those tracks traverse a portion of the Project Area proposed for S/LI/RD uses in Alternative A, and an area proposed for residential uses not scheduled for development until after 2000 in either Alternative A or B.

By the year 2020, build-out of Alternatives A and B would include the following changes to the railroad network in the Project Area and vicinity, beyond those specified for the year 2000:

- Removal of the industrial lead tracks connecting the mainline to SF's Illinois Street track at 16th Street.
- Removal of the Illinois Street track north of China Basin Street.
- Since removal of the 16th Street and Illinois Street tracks would eliminate the connection between the SP mainline and service to the Northern and Central Waterfronts, the use of optional routes outside the Project Area would be required. Those are discussed later in this Impact section; see pp. VI.E.152-VI.E.156 and VI.E.178-VI.E.183.

Parking

Both off-street and on-street (curb) parking spaces are assumed to be available in the future within the Project Area, with the type and amount of parking varying by Alternative, depending on the amount and type of development forecast to occur by a given year. Each land use is assumed to require a different amount of parking to be provided off-street. The supply of off-street parking assumed for each Alternative is based on multiplying the amount of each land use expected to be developed by the unit amount of parking assumed to be supplied for each land use. For example, one parking space is assumed to be provided per unit of housing within each building structure, while one parking space is assumed to be provided per 1,000 square feet of retail space. The supply of on-street parking spaces is based on the linear extent of arterial and neighborhood collector streets assumed to be built by 2000 or 2020. (Numerical descriptions of factors used to calculate the expected supply of parking appear on pp. VI.E.159–VI.E.161.)

Pedestrian and Bicycle Facilities

Pedestrian facilities are assumed to be provided where demand for those facilities is expected to occur. In Alternatives A and B, sidewalks along proposed streets are assumed to be provided in the residential, retail and office areas. Land uses in port-related and light industrial areas are assumed to have pedestrian facilities similar to those existing in the Project Area today. Similarly, Alternative N is assumed to have a minimum of pedestrian amenities in the M-2 areas.

All of the Alternatives would retain the existing signed bicycle routes on Townsend, Third and Fourth Streets next to or through the Project Area. Alternatives A and B would add signed bicycle routes on Berry and 16th Streets between 2000 and 2020, while Alternative N would add a signed route only on 16th Street after 2000.

TRAVEL FORECASTING APPROACH

For regional and citywide highways and transit systems, and project-level intersections and MUNI routes, the analysis of transportation impacts is based on forecasts of usage or travel. A brief description of the iterative process used to create forecasts of future cumulative highway and transit travel is presented in the following pages, to explain the different sources of information used, and how assumptions about future travel capacities affect the forecasts. A more extensive explanation of the technical procedures used to create the forecasts of travel at intersections is contained in Appendix E, p. XIV.E.16. The process used to create the forecasts of travel on MUNI routes serving the Project Area is explained on pp. VI.E.148–VI.E.149. The process used to create the forecasts of parking demand is described on pp. VI.E.158–VI.E.159.

Forecasts of usage or travel were not created for rail freight, maritime, pedestrian and bicycle facilities. The analysis of the more localized impacts for those transportation modes was done on a different basis than was the case for the roadway and transit travel forecasts. The scope of analysis of those local modes is presented under Project Area impacts, p. VI.E.140.

Cumulative Travel Components

Forecasts of cumulative travel have been prepared for the highway and transit facilities and services across the MUNI and regional screenlines described on pp. VI.E.31-VI.E.33, and shown in Figure VI.E.8, p. VI.E.33. Cumulative travel across each screenline consists of the following possible components: travel to and from the Downtown & Vicinity, travel to and from areas in San Francisco outside the Downtown & Vicinity, and travel to and from other counties in the region. (Travel to and from the Project Area is included within travel to and from the Downtown & Vicinity.)

Cumulative travel forecasts created for the p.m. peak period produce local travel forecasts that are used to analyze intersections in or near the Project Area. (The intersection analysis is presented on p. VI.E.140-VI.E.148 and VI.E.166-VI.E.175.) The forecasts of vehicular travel at intersections in the Project Area or serving as freeway access points are therefore related directly to the cumulative travel forecasts. This is done consistently to account for the three components of cumulative travel demand that would occur at each screenline, at project-level intersections, and on individual MUNI routes proposed to serve the Project Area.

Travel Forecasting Model

To define and describe travel-related impacts contributed by the Mission Bay Alternatives to future cumulative screenline travel demand, a model was created that would logically simulate the numbers of trips that would occur during the p.m. peak period and p.m. peak hour within the Project Area, between the Project Area and the rest of the Downtown & Vicinity, and between the Downtown & Vicinity and the rest of the region, including other areas of San Francisco./69/ The following paragraphs explains how separate forecasts for the components of cumulative travel are produced.

The travel model developed for this analysis continues the travel forecasting procedures used for the Downtown Plan EIR, but also incorporates updates in available data, and refinements of the methodology. Actual data from 1980 and 1985 were used to define the geographic, modal and peaking factors that constitute the travel model used in this analysis. Forecasts of future employment and population were used as inputs to the model to create forecasts of future travel demand. The steps followed to define and validate the travel model are described in Appendix E. pp. XIV.E.1-XIV.E.11.

Travel To and From the Downtown & Vicinity

The travel model describes probable travel behavior for persons traveling to or from the Downtown & Vicinity during the p.m. peak period and peak hour. In effect, the calibrated travel model creates forecasts of trips for each screenline that indicate the percentages of all trips made toward or away from the Downtown & Vicinity by mode, and the percentages of each mode's daily travel occurring during the p.m. peak period and hour. Those travel factors were derived from surveys of employees and residents of the Downtown & Vicinity, as described in Appendix E, p. XIV.E.5.

The travel model produces forecasts of the following two types of trips: work-related trips and "other" trips. Forecasts of work-related trips are based on forecasts of employment and of the distribution of places-of-residence for (future) employees of the Downtown & Vicinity./70/ Forecasts of trips that are not work-related were produced, using p.m. peak-period relationships (i.e., probabilities) established between non-work trips and work trips, based on 1980 and 1985 information./71/ Those relationships are assumed to continue to be valid into the future because the future mix of work and non-work activities found in the Downtown & Vicinity is not expected to change substantially from today. Although there would be substantial changes in the future occurring in the mix of activities within the Project Area because of the Mission Bay Alternatives, the Project Area would represent a small portion of activities within the Downtown & Vicinity.

For the year 2000, one geographic distribution of work-related trips from or to the Downtown & Vicinity was assumed for all the Mission Bay Alternatives, rather than three different ones, because of the relatively small differences among the forecasts of the Downtown & Vicinity's population and employment associated with the three Mission Bay Alternatives. For the year 2020, three geographic distributions of trips were assumed, because forecasts of population and employment for the Downtown & Vicinity are different among Alternatives for the build-out year (see VI.B. Land Use, Business Activity, and Employment, Table VI.B.24, p. VI.B.72 and VI.C. Housing and Population, Table VI.C.11, p. VI.C.47). For both 2000 and 2020, geographic distributions of non-work trips are assumed to remain the same as in 1985, and not to change among Alternatives, because the current relationship between work-related and non-work-related travel is expected to continue.

Travel To and From San Francisco Areas Not Included in the Downtown & Vicinity

For both 2000 and 2020, three slightly different forecasts of employment and population for the rest of San Francisco outside the Downtown & Vicinity were created, reflecting effects of the Mission Bay Alternatives. Those employment and population forecasts were used to modify MTC's forecasts of travel for that part of the city, which were based on different employment and population projections produced by ABAG./72/

Travel To and From Other Parts of the Region

Forecasts of employment and population for the year 2000 prepared by ABAG (Projections '85) and related forecasts of travel by MTC were used to describe "regional" travel occurring at screenlines when both ends of a trip would be outside San Francisco. Forecasts of regional employment and population for the year 2020 by county prepared for this EIR analysis were used to extrapolate to 2020 the forecasts of travel produced by MTC.

Forecasts of 2000 and 2020 Travel

The approach used to create the forecasts of travel differs for the two analysis years. The major differences are explained below.

For the year 2000, two levels of travel forecasts were required for this EIR analysis, to describe how future cumulative travel demand at the regional screenlines would adjust to available capacity. The first, preliminary travel forecast assumes no changes in the percentages of future travel by mode from those that existed in 1985. The resulting "unconstrained" forecast of travel demand indicates how the duration of highway congestion might expand, if travelers do not shift from vehicles to other modes, even if they have reasonable opportunities to do so. The second and final travel forecasts assume that persons attempting to travel during the peak period in private vehicles who would not find roadway capacity available to do so, would shift to other available modes during the peak period, instead of driving their cars outside the peak travel hours. This forecast of "modal shifts" produces the final cumulative screenline and project-level impacts of travel associated with the future cumulative population and employment. The comparison of year 2000 p.m. peak period "unconstrained vehicle demand" vs. roadway capacity indicates that if no shifts to transit nor to ridesharing were to occur, the following operating conditions would be projected for the Bridges and freeways serving outbound trips from San Francisco:

- Congestion on the Golden Gate Bridge would worsen from less than two hours to about four hours under "unconstrained" demand conditions.

- Congestion on the San Francisco - Oakland Bay Bridge, currently about two p.m. hours in duration, would extend for over 5.5 p.m. hours.

- On southbound I-280 at the San Francisco County line, future unconstrained vehicular traffic demand would be accommodated within available highway capacity.

- On southbound U.S. 101 at the San Francisco County line, congestion would expand from less than one hour currently to about 2.5 p.m. hours under the "unconstrained" demand scenario.

The reaction of individual travelers to not having sufficient roadway capacity to travel in private vehicles during peak travel hours would depend on the characteristics of their employment area and on the nature of their work. When persons are traveling to areas where transit service is too poor to offer a competitive choice, or if land use patterns and the availability of free or low-cost parking provide incentives for travelers to use private vehicles, travelers would not change modes. As a result, those travelers' cumulative decisions would directly expand the duration of congestion on regional highways. However, the history of travel demand in relation to the levels of service available on the different modes serving Downtown San Francisco shows that substantial modal shifts have occurred in the past, because transit and ridesharing provide travel times competitive with those of congested roadways, and intensive land use concentrations and high parking costs discourage auto use. That is why the final travel forecasts, which assume that travelers from the Downtown & Vicinity would continue to shift to transit and ridesharing modes, is used in this EIR analysis to describe transportation impacts.

The analysis of travel impacts is based on the following factors influencing cumulative travel:

- Persons traveling to or from the Downtown & Vicinity for work-related purposes would shift from low-occupancy private vehicles to higher-occupancy vehicles and transit if they would not be able to find sufficient roadway capacity during the two-hour peak period of 4:00 to 6:00 p.m., and if "reasonably assured capacity" is projected to be available to accommodate shifts to transit and high-occupancy vehicles during the two-hour peak period.

- Persons traveling to or from the Downtown & Vicinity for non-work purposes would continue to travel on each mode at the same percentages as in 1985.

- Persons not traveling to or from the Downtown & Vicinity (i.e., those passing through the Downtown & Vicinity) would also continue to travel on each mode at the same percentages as in 1985.

Extensive modal shifts are projected between 1985 and 2000 for work-related travel to and from the Downtown & Vicinity across two regional screenlines, to accommodate cumulative travel on the "reasonably assured capacities" for transit on high-occupancy vehicles projected to be available during the p.m. peak period. The possible impacts on economic levels forecast for the Downtown & Vicinity and the rest of the region associated with the analysis of future cumulative travel constraints are described on p. VI.E.91.

The final modal factors generated in the 2000 analysis, which assume the shifts described above, were used to create the year 2020 forecasts of travel by mode across regional screenlines. Those forecasts of 2020 travel demand are those used to describe the additional capacity by mode that would be required to accommodate cumulative growth in travel demand between 2000 and 2020.

The large number of uncertainties involved in forecasting transportation system capacity, and travel demand and behavior as far into the future as 2020, dictates that the travel forecasting approach for that year be one that simply indicates for each mode the additional capacity required beyond the level assumed for the year 2000. Hypothesizing what facilities and services would exist by 2020, and how year 2020 travel demands would be affected, would be highly speculative. Hence, the impact analysis conservatively assumes no transportation improvements for the 20 years after 2000 to describe the type and magnitude of transportation capacity increases required to serve cumulative travel by 2020.

Modal Shifts

Cumulative vehicular travel projected for the year 2000 across the Golden Gate and Bay Bridges, and U.S. 101 at the San Mateo County line would exceed capacity available during the p.m. peak period. Therefore, the percentages of future work-related trips from the Downtown & Vicinity projected to occur on each mode crossing the North Bay and East Bay screenlines were changed from their 1985 percentages. The percentages of work-related trips by mode made by travelers from the Downtown & Vicinity across the South Bay screenline were not assumed to change. The following paragraphs describe the logic for the mode changes made in response to the projections of unconstrained travel demand. Percentages of modal shares used to create the final forecasts of travel for the years 2000 and 2020, and the projected changes from 1985 modal shares, are shown in Table VI.E.7.

TABLE VI.E.7: PERCENTAGES OF PERSON TRIPS BY MODE OUTBOUND FROM DOWNTOWN & VICINITY , 1985, 2000 AND 2020/a/

Screenline	Year	Vehicles/b/		% Change from 1985/f/	Muni		BART		% Change from 1985/f/	Other/c/							
		Peak Hour/d/	Peak Period/e/		Peak Hour	Peak Period	Peak Hour	Peak Period		Peak Hour	Peak Period						
Within/g/	/a/	9	9		16	16	1	1		74	74						
SF Northeast	/a/	11	12		60	58				29	31						
SF Northwest	/a/	41	44		57	53				2	3						
SF Southeast	/a/	44	46		27	27	19	17		9	10						
SF Southwest	/a/	28	29		58	58	13	12		1	2						
												Golden Gate Buses			Golden Gate Ferries		
												Peak Hour	Peak Period	% Change from 1985	Peak Hour	Peak Period	% Change from 1985
North Bay																	
	1985	49	54							3	3	39	35		9	7	
	/h/	33	38	-32						3	3	55	50	+41	10	8	+15
												AC Transit					
												Peak Hour	Peak Period	% Change from 1985			
East Bay																	
	1985	26	30				49	47				25	23				
	/h/	17	19	-37			60	59	+26			23	22	-5			
												CalTrain			SamTrans		
												Peak Hour	Peak Period	% Change from 1985	Peak Hour	Peak Period	% Change from 1985
South Bay																	
Alt. N	/a/	51	56	--	6	6	12	11	--	1	1	18	17	--	12	9	--
Alts. A and B	/h,i/	53	58	+4	6	6	13	12	+9	1	1	14	13	-22	13	10	+11

/a/ Unless change is indicated, percentages shown are identical for 1985, 2000 and 2020. Percentages for 2000 and 2020, while calculated from projections for Alternative N, do not differ by Alternative, except for the South Bay screenline. Reasons for the changes in modal shares are discussed on pp. VI.E.72-VI.E.79.

/b/ Percentages of travelers from Downtown and Vicinity in single-occupant vehicles, carpools and vanpools.

/c/ Percentages of travelers from Downtown and Vicinity walking, or riding bicycles, motorcycles or taxis.

/d/ Percentages of travelers from Downtown and Vicinity crossing each screenline between 4:30 and 5:30 p.m. using each mode.

/e/ Percentages of travelers from Downtown and Vicinity crossing each screenline between 4:00 and 6:00 p.m. using each mode.

/f/ Percent differences shown are for shares of travel among modes during the 4:00 - 6:00 p.m. peak period. Slight differences would apply to the 4:30 - 5:30 p.m. peak hour. Percentages do not represent changes projected in the numbers of trips made by mode between 1985 and the future analysis year.

/g/ These trips do not cross a screenline, but remain within Downtown and Vicinity.

/h/ Mode percentages for 2000 and 2020 are the same.

/i/ Mode percentages in 1985 for Alternatives A and B at the South Bay screenline are the same as those shown for Alternative N.

SOURCE: Barton-Aschman Associates, Inc.

By the year 2000, the San Francisco - Oakland Bay Bridge (East Bay screenline) and the Golden Gate Bridge (North Bay screenline) are projected to be operating at capacity at least during the 4:00 to 6:00 p.m. peak period. Those bridges would be operating at capacity as a result of projected growth in travel to the East Bay and North Bay, respectively, from the Downtown & Vicinity and the remainder of San Francisco and the region. Shifts by travelers from the Downtown & Vicinity to an increased use of transit and ridesharing are assumed to occur during the p.m. peak period to accommodate the combination of travel growth from the Downtown & Vicinity and the rest of the region.

East Bay Screenline. Work-related travelers from the Downtown & Vicinity to the East Bay are projected to increase their use of BART, AC Transit, and carpooling because of a lack of roadway capacity to accommodate additional Transbay vehicle trips. The projected shift in modes by travelers from the Downtown & Vicinity would allow some growth in vehicle trips from and to locations in the rest of the region ("through" trips) to be accommodated during the p.m. peak period. (See pp. VI.E.89-VI.E.91 for discussion of East Bay screenline impacts, including excess vehicle demand and spreading of duration of peak highway congestion.) Increases in the use of transit or carpooling are not assumed for persons ("through" travelers) projected to travel to and from the East Bay and areas outside the Downtown & Vicinity, because those types of travel changes are difficult to achieve in areas with limited transit services and carpooling incentives. Travel forecasts for the year 2000 assume substantial shifts to BART and AC Transit and an increase in carpooling by persons making work-related trips from Downtown & Vicinity during the p.m. peak period. The projected shifts to BART and AC Transit could be accommodated by those agencies' "reasonably assured capacities", and the HOV facilities programmed by MTC for I-80 and I-580 would reduce travel times for HOV relative to other modes of travel to other modes of travel./73/

North Bay Screenline. Increases in the use of Golden Gate Transit buses and ferries and in carpooling by travelers from the Downtown & Vicinity making work-related trips to the North Bay are assumed for the same reasons described above for the East Bay screenline. Again, increases in transit use or ridesharing are not projected for travel to and from areas outside the Downtown & Vicinity ("through" travel). Increases in bus and ferry ridership could be accommodated by expanded bus and ferry services, for which the Golden Gate Transit District would attempt to secure funding./74/ Programmed and planned extensions of HOV lanes on U.S. 101, especially along the most congested freeway sections in Marin County, make it reasonable to project increases in carpooling across this screenline.

South Bay Screenline. Modal shifts to transit are not assumed for the South Bay screenline, because sufficient roadway capacity at the San Mateo County line is projected (for the year 2000) to accommodate almost all peak hour and peak period trips. I-280 is projected to operate below capacity during the peak period, while U.S. 101 would be at capacity for about 2.5 peak hours.

The future ratio of demand-to-capacity projected to exist at the U.S.-101/I-280 interchange could affect future modal shares for the South Bay screenline. While that freeway-to-freeway interchange is currently operating at capacity for about 1.5 p.m. hours, by 2000 cumulative growth in vehicular travel is projected to have the interchange operating at capacity throughout the two-hour peak period. However, the U.S.-101/I-280 interchange can be avoided if vehicles use streets in the Potrero Hill, Inner Mission, Mission Bay, Bayfront, and South Bayshore areas; and that opportunity for diversion to local streets is assumed to continue to be available in the future. The major impetus for shifts to transit serving the South Bay screenline, if any, would be due to the cumulative impacts of congestion affecting persons traveling through the U.S.-101/I-280 interchange, on U.S. 101 north of the San Mateo County line, and on U.S. 101 in San Mateo County (see discussion on pp. VI.E.91-VI.E.92). If commuters were to switch to transit to avoid highway congestion at the U.S.-101/I-280 interchange and other bottlenecks, sufficient capacity would be available to serve the increased demand for BART, CalTrain, or SamTrans service (see discussion on p. VI.E.103).

San Francisco Screenlines. Modal shifts are not assumed for the screenlines within San Francisco. Each traveler's propensity to use transit for trips between the Downtown & Vicinity and other areas of San Francisco is affected more by the availability and cost of parking at either the origin or destination end of a trip than by roadway congestion, as the grid pattern of San Francisco's street network makes it relatively easy to bypass congestion that would occur on some travel routes. No changes are foreseen in the availability or cost of parking that would be sufficient to justify projecting changes in modal shares for trips between the Downtown & Vicinity and other areas of San Francisco.

The percentages of trips from the Downtown & Vicinity expected on each travel mode for the year 2000 (modal shares) are assumed to continue to the year 2020 because reasonable predictions of capacity cannot be made that far into the future. That is why the assumption that modal shares would not change between 2000 and 2020 is being used in this analysis to identify changes in capacity projected to be required to accommodate year 2020 travel demand in above and beyond the year 2000 "reasonably assured capacities."

Other Factors Affecting the Travel Forecasts

After the modal shifts in travel from the Downtown & Vicinity have been established, the two other primary factors that affect the travel forecasts are: 1) the proportion of daily trips occurring on a mode during the p.m. peak period and hour, and 2) the geographic distribution of trips to or from the Downtown & Vicinity during the p.m. peak period and hour, as influenced by place-of-residence and place-of-employment forecasts.

The travel forecasts are based on the assumption that work start and end times will not change, and that the times when persons travel for work and non-work purposes will not change. As a result, the proportions of daily travel by mode during the p.m. peak period and hour would not change from the characteristics estimated for 1985 (although modal shifts would affect the means by which trips would be made during those times).

The distribution of work-related travel from (or to) the Downtown & Vicinity that would be made to (or from) specific geographic areas in the region would change, depending on the place-of-residence projections for employees of the Downtown & Vicinity and the place-of-employment projections for residents of the Downtown & Vicinity, in the years 2000 and 2020. Increases in the geographic shares of travel from the Downtown & Vicinity to other parts of the City or region would occur if the percentage growth in housing and employed residents in one of those residence areas exceeded the percentage growth in employment in the Downtown & Vicinity, and/or if the propensity of employed residents of that area to be employed in the Downtown & Vicinity increased. Decreases in the geographic shares of travel from the Downtown & Vicinity would occur if another area's rate of growth in housing and employed residents is expected to be less than rate of employment growth in the Downtown & Vicinity and/or if the propensity of employed residents of that area to be employed in the Downtown & Vicinity decreased (see VI.C. Housing and Population, pp. VI.C.26-VI.C.35 and VI.C.51-VI.C.63).

Percent changes in the geographic distribution of work-related trips from the Downtown & Vicinity across each screenline must be combined with percent increases in the amount of employment in the Downtown & Vicinity to reveal the appropriate percent changes in work-related travel projected to occur from the Downtown & Vicinity between 1985 and 2000 or 1985 and 2020 for each screenline. Those changes are described below.

The resulting percent changes of outbound peak period travel for each screenline are shown in Table VI.E.8. It should be noted that for the year 2000, the employment

TABLE VI.E.8: PERCENTAGE INCREASES IN OUTBOUND P.M. PEAK-PERIOD AND PEAK-HOUR TRAVEL DEMAND FROM DOWNTOWN & VICINITY, 2000 AND 2020/a/

		Percent Increase						
			Between 1985 and 2020/d/			Between 2000 and 2020/e/		
Screenline	Share of All 1985 Travel Demand From Downtown & Vicinity/b/	Between 1985 and 2000/c/	Alternative A	Alternative B	Alternative N	Alternative A	Alternative B	Alternative N
Within/f/	4%	41%	74%	76%	56%	22%	23%	11%
SF Northeast	7	22	35	32	35	10	8	10
SF Northwest	15	13	25	23	26	10	9	12
SF Southeast	12	14	25	22	27	10	8	11
SF Southwest	20	8	16	14	18	8	7	9
North Bay	7	53	84	73	82	21	14	20
East Bay	23	72	96	89	95	13	11	13
South Bay	12	32	59	46	58	20	11	20

/a/ Outbound p.m. peak-period travel demand refers to the sum of home-based-work, home-based-other, and non-home-based trips projected to be made from the Downtown & Vicinity that would cross a screenline between 4:00 and 6:00 p.m.

/b/ These estimates are based on the travel forecasting model developed for this analysis. For additional discussion, see Appendix E. Transportation, pp. VI.E.26-VI.E.27.

/c/ The percentages incorporate changes projected between 1985 and 2000 in (1) growth in employment in Downtown & Vicinity; and (2) the distribution of places-of-residence of the Downtown & Vicinity employees. The percent changes in this column are based on the projections for Alternative N, with no statistically significant differences projected among Alternatives for the year 2000.

/d/ These percentages incorporate changes between 1985 and 2020 projected in (1) growth in employment in Downtown & Vicinity, (2) the distribution of places-of-residence of the Downtown & Vicinity employees, and (3) modes of travel used.

/[illegible]/ These percentages incorporate changes between 2000 and 2020 projected in (1) growth in employment in Downtown & Vicinity, and (2) the distribution of places-of-residence of the Downtown & Vicinity employees.

/f/ These trips do not cross a screenline during the 4:00-6:00 p.m. period, but remain within Downtown & Vicinity.

SOURCE: Barton-Aschman Associates, Inc. Based on place-of-residence distributions developed by Recht Hausrath and Associates, and regional travel relationships among trip purposes developed by MTC.

forecasts are so similar across the Mission Bay Alternatives that there is only one forecast of growth in work-related travel across the screenlines for the Downtown & Vicinity. For the year 2020, variations among the population and employment forecasts for the Mission Bay Alternatives result in three different forecasts of travel growth from the Downtown & Vicinity./75/

Changes over time in the numbers of travelers from the Downtown & Vicinity crossing each screenline would be due to the following factors:

- The shares and numbers of trips staying or ending within the Downtown & Vicinity would increase because housing growth would be more rapid than employment growth in the Downtown & Vicinity for all Alternatives in both 2000 and 2020. By 2020, Alternatives A and B would generate 74% and 76%, respectively, more p.m. peak person trips within the Downtown & Vicinity than existed in 1985, while Alternative N would generate 56% more trips.

- The shares and numbers of trips from the Downtown & Vicinity projected to other areas of San Francisco would not grow as much as would employment in the Downtown & Vicinity, because the rate of employment growth in the Downtown & Vicinity would be greater than the rate of growth in housing in the rest of San Francisco. With all the Alternatives, the lowest growth in travel from the Downtown & Vicinity is projected to Southwest San Francisco and the highest to Northeast San Francisco. Differences among Alternatives would be slight. Alternative N, which would provide no additional housing in the Project Area, would have the highest growth rates in p.m. peak travel to other areas of San Francisco; Alternative B, which would provide the greatest amount of housing in the Project Area, would have the lowest travel growth rates.

- The shares and amounts of travel to the East Bay and North Bay Counties would grow faster than employment in the Downtown & Vicinity, because the rates of housing growth in those areas of the region are projected to be greater than the rate of growth of employment in the Downtown & Vicinity. Alternative A is projected to have the highest growth rates in p.m. peak travel across both screenlines, and Alternative B the lowest.

- The increase in the amount of travel to the South Bay would be very similar to the employment increase projected in the Downtown & Vicinity. For the South Bay, the rate of growth in housing is projected to be less than for the other two regional screenlines. Growth in travel from the Downtown & Vicinity to the South Bay would be slightly greater than growth in Downtown & Vicinity employment for Alternatives A and N than for Alternative B, which would maintain equal rates of growth in South Bay travel and Downtown & Vicinity employment.

Relation Between Travel Forecasts for the Downtown & Vicinity and the Project Area

The screenline travel forecasts are based on using available information about all of the Downtown & Vicinity to determine a composite future pattern of travel to or from the Downtown & Vicinity. The forecasts prepared for the analysis of screenline travel impacts acknowledge that places of residence and modal shares would be different for travelers from different areas within the Downtown & Vicinity. However, composite travel factors are used because the Downtown & Vicinity is viewed as a single entity for the preparation of screenline travel forecasts, on the basis of the following points:

- The large majority of employees in the Downtown & Vicinity are and would continue to be those in the C-3 District, the South-of-Market, and the Civic Center. Information is available from surveys to identify the current travel patterns of those employees. Changes in the characteristics of employees, places of residence and capacities of transportation system serving those areas have been incorporated into the travel forecasts, as discussed on p. VI.E.73.
- The Project Area, which would grow substantially in employment with all three Alternatives, and in population with Alternatives A and B, would represent a very small portion of employment and population in the Downtown & Vicinity, even at build-out.

By build-out (in the year 2020), the Project Area would account for small percentages of p.m. trips outbound from the Downtown & Vicinity, as follows: 5.0% with Alternative A, 1.3% with Alternative B, and 3.5% with Alternative N. The Project Area's percentage of p.m. trips made outbound from the Downtown & Vicinity would increase to the percentages listed above from 0.6% in 1985; and from 2.2% with Alternative A, 1.2% with Alternative B, and 1.6% with Alternative N in 2000.

The Project Area would account for larger percentages of p.m. trips made inbound than of p.m. trips made outbound from the Downtown & Vicinity. In the year 2020, the following percentages of one-way trips made by residents of the Downtown & Vicinity are forecast to be made from (or to) the Project Area: 18.1% with Alternative A, 22.2% with Alternative B, and less than 0.1% with Alternative N. Those percentages of Project Area trips made by residents of the Downtown & Vicinity would increase from 0.1% in 1985, and 8.6% with Alternative A, 8.0% with Alternative B, and 0.1% with Alternative N in 2000.

IMPACT ANALYSIS AND RESULTS

The following pages describe projected future cumulative and project-level conditions, and the impacts associated with the Mission Bay Alternatives. The presentation of impacts begins with the descriptions of future cumulative highway and transit travel conditions at screenlines, as those conditions are related to the project-level impacts of the Mission Bay Alternatives on street intersections and MUNI routes in the Project Area. The presentation of impacts is for the same categories and in the same order of transportation topics as introduced in the setting.

YEAR 2000 SCREENLINE TRAVEL EFFECTS/76/

For all screenlines, except the South Bay, the numerical differences in cumulative highway vehicle volumes and transit riders would be relatively small between the Mission Bay Alternatives, because differences in the Project Area's employment and housing growth would be overwhelmed numerically by the growth in employment and housing projected for the rest of the Downtown & Vicinity, San Francisco, and the region. The Project Area would account for 3% to 8% of the increase in employment in the Downtown & Vicinity between 1985 and 2000, and 2% to 25% of the increase in employment in the Downtown & Vicinity between 2000 and 2020, depending on the Mission Bay Alternative (see Table VI.B.22, p. VI.B.64). As work-related travel accounts for about four-fifths of all travel during the p.m. peak period, the Project Area would account for about the same percentages as above in the increase in all trips made during the p.m. peak period. In addition, the Mission Bay Alternatives would contribute even smaller percentages of the increments of cumulative travel across screenlines, because that travel would also include travel from the rest of San Francisco and the region, which is also projected to grow.

As future p.m. peak-period travel outbound from Mission Bay is assumed to have the same geographic and modal distributions as travel from all of the Downtown & Vicinity, the share of outbound p.m. peak-period travel across screenlines contributed by Mission Bay would be related to Mission Bay's share of employment in the Downtown & Vicinity. The projections of travel outbound (away) from the Downtown & Vicinity across screenlines during the p.m. peak period, presented and discussed in the following sections, are based on that assumption. These final projections incorporate assumptions of modal shifts from vehicles to transit and ridesharing, shown in Table VI.E.7, p. VI.E.77 for each screenline.

The variation in land uses and transportation features among the Mission Bay Alternatives would have their greatest effect on travel at the South Bay screenline. With Alternatives A and B, CalTrain ridership would be lower, and use of BART, SamTrans, I-280 and U.S. 101 higher than with Alternative N. The difference in usage would result from relocating the CalTrain terminal to Seventh and Channel Streets in Alternatives A and B, and retaining the terminal at Fourth and Townsend Streets in Alternative N.

Forecasts of screenline travel demand by mode are discussed in the following paragraphs, with explanations of the amounts of travel projected to be made from the Downtown & Vicinity or the rest of the region. The discussion that follows is of travel projected to occur on highways and transit in the direction leading away from the Downtown & Vicinity during the p.m. peak period, as the demand for travel away from the Downtown would continue to have the greatest impact on peak-period travel.

Highways

With all three Alternatives, the Golden Gate Bridge, the San Francisco - Oakland Bay Bridge, and U.S. 101 at the San Mateo County line would be operating at capacity throughout the 4:00 to 6:00 p.m. peak period by the year 2000. I-280 would not be operating at capacity at the San Mateo County line, even during the peak hour, but would be expected to operate at capacity during the 4:00 to 6:00 p.m. peak period at its interchange with U.S. 101. The durations of highway congestion projected to occur with shifts by travelers from Downtown & Vicinity to transit and ridesharing are shown in Table VI.E.9. Estimates of the number of trips from each travel component (Project Area, Downtown & Vicinity, rest of region) during the 4:00 to 6:00 p.m. peak period are shown in Table VI.E.10, pp. VI.E.87-VI.E.88.

Golden Gate Bridge

On the northbound lanes of the Golden Gate Bridge, the cumulative travel demand projected from the Downtown & Vicinity (including the Project Area) and from the rest of San Francisco and the region would use available capacity throughout the 4:00 to 6:00 p.m. period. Cumulative travel demand would be similar for all Alternatives. The Golden Gate Bridge would accommodate the 20% growth in p.m. peak-period travel projected from San Francisco and the region between 1985 and 2000. Almost no growth (2%) in vehicular peak-period travel from the Downtown & Vicinity to Marin and Sonoma Counties is forecast between 1985 and 2000, because of the shifts from vehicular travel to transit and ridesharing assumed for travelers from the Downtown & Vicinity.

Throughout the 4:00 to 6:00 p.m. period, the northbound lanes of the Golden Gate Bridge would be operating at LOS E. Vehicular capacity on the Bridge is assumed not to change from that provided by the current four (reversible) lanes. With the year 2000 volumes projected to be equal to capacity, the northbound lanes of the Golden Gate Bridge would operate at about 30 mph.

TABLE VI.E.9: HIGHWAY TRAVEL DEMAND AT REGIONAL SCREENLINES, 1985 AND 2000, AFTER MODAL SHIFTS/a/

			1985			2000			
Screenline	Facility	Time	Demand	Capacity	D/C/b/	Demand/c/	Capacity	Demand Constrained by Capacity/c/	D/C/b/
North Bay	Golden Gate Bridge	3:00 - 3:59 p.m.	5,400 /d/	7,200	0.75	6,500	7,200	6,500	0.90
		4:00 - 4:59 p.m.	6,300 /d/	7,200	0.88	7,200	7,200	7,200	1.00
		5:00 - 5:59 p.m.	6,500 /d/	7,200	0.90	7,200	7,200	7,200	1.00
		6:00 - 6:59 p.m.	5,300 /d/	7,200	0.74	6,300	7,200	6,300	0.88
							Estimates of Congestion Duration -- 2.0		
East Bay	San Francisco - Oakland Bay Bridge	3:00 - 3:59 p.m.	9,200 /e/	9,700	0.95	12,700	9,700	9,700	1.00
		4:00 - 4:59 p.m.	9,700 /e/	9,700	1.00	9,700	9,700	9,700	1.00
		5:00 - 5:59 p.m.	9,000 /e/	9,700	0.93	9,700	9,700	9,700	1.00
		6:00 - 6:59 p.m.	7,800 /e/	9,700	0.80	10,750	9,700	9,700	1.00
							Estimates of Congestion Duration -- 4.5		
South Bay	I-280	3:00 - 3:59 p.m.	3,975 /f/	8,000	0.50	4,775	8,000	4,775 /g/	0.60
		4:00 - 4:59 p.m.	4,875 /f/	8,000	0.61	5,850	8,000	5,850 /g/	0.73
		5:00 - 5:59 p.m.	5,450 /f/	8,000	0.68	6,550	8,000	6,550 /g/	0.82
		6:00 - 6:59 p.m.	4,375 /f/	8,000	0.55	5,250	8,000	5,250 /g/	0.66
							Estimates of Congestion Duration -- less than 1		
	U.S. 101	3:00 - 3:59 p.m.	6,225 /h/	8,000	0.78	7,475	8,000	8,000 /i/	1.00
		4:00 - 4:59 p.m.	7,225 /h/	8,000	0.90	8,675	8,000	8,000 /i/	1.00
		5:00 - 5:59 p.m.	7,150 /h/	8,000	0.89	8,575	8,000	8,000 /i/	1.00
		6:00 - 6:59 p.m.	5,125 /h/	8,000	0.65	6,150	8,000	6,875 /i/	0.86
							Estimates of Congestion Duration -- 2.5		

/a/ Volumes shown are total volumes occurring or projected in the direction of travel leading away (outbound) from Downtown & Vicinity during p.m. hours.
/b/ Ratio of demand-to-capacity.
/c/ Constrained demand refers to projections of future vehicular volumes based on changing modal shares from estimated 1985 conditions for travelers form Downtown & Vicinity unable to be accommodated by highway capacity in two peak hours.
/d/ Based on counts for June and September 1986 supplied by Golden Gate Bridge, Highway and Transportation District.
/e/ Based on counts taken during Spring 1985 by Caltrans.
/f/ Counts taken by Barton-Aschman Associates, Inc., March 1987, at St. Charles Avenue; counts were adjusted using data from CalTrans to represent volumes on four-lane section of I-280 at Alemany Boulevard.
/g/ Capacity available on I-280 at the San Mateo County line is constrained by capacity of the U.S. 101/I-280 interchange. The amount of demand to be diverted at the San Mateo County line may be higher than demand accommodated through the Route101/I-280 interchange.
/h/ Counts taken by Barton-Aschman Associates, Inc., March 1987.
/i/ Capacity on U.S. 101 through the U.S 101/I-280 may reduce the amount of demand that has been projected to reach the San Mateo County screenline.

SOURCE: Barton-Aschman Associates, Inc.

TABLE VI.E.10: P.M. PEAK PERIOD AND P.M. PEAK HOUR HIGHWAY VOLUMES AT SCREENLINES, 1985 AND 2000

		1985	2000					
Screenline	Highway	/e/	Alt. A	% Change 1985-2000	Alt. B	% Change 1985-2000	Alt. N	% Change 1985-2000
P.M. Peak Period (4:00-6:00 p.m.)								
North Bay	Golden Gate Bridge							
	total vehicles/a/	12,800	14,400 /g/	13	/f/	/f/	/f/	/f/
	vehicles from Project Area/b/	30	120	300	75	150	100	233
	vehicles from Downtown & Vicinity/c/	5,380	5,500	2	/f/	/f/	/f/	/f/
	vehicles from rest of region/d/	7,420	8,900	20	/f/	/f/	/f/	/f/
East Bay	San Francisco – Oakland Bay Bridge							
	total vehicles	18,700	19,400 /h/	2	/f/	/f/	/f/	/f/
	vehicles from Project Area/b/	50	50	0	100	100	150	200
	vehicles from Downtown & Vicinity	8,640	8,640	0	/f/	/f/	/f/	/f/
	vehicles from rest of region	10,060	10,760	7	/f/	/f/	/f/	/f/
	total vehicles exceeding capacity of 19400	-	3,125		/f/		/f/	
South Bay	Highway 101							
	total vehicles	14,350	16,000 /i/	21	16,000 /i/	/f/	16,000 /i/	/f/
	vehicles from Project Area/b/	30	130	333	/f/	/f/	/f/	/f/
	vehicles from Downtown & Vicinity	5,450	5,950	9	/f/	/f/	/f/	/f/
	vehicles from rest of region	8,900	10,050	13	/f/	/f/	/f/	/f/
	total vehicles exceeding capacity of 16000	-	1,550		1,250		1,050	
	I-280							
	total vehicles	10,325	12,450	21	12,400	20	12,225	18
	vehicles from Project Area/b/	20	120	500	70	250	80	300
	vehicles from Downtown & Vicinity	3,925	5,225	33	5,175	32	5,000	27
	vehicles from rest of region	6,400	7,225	13	7,225	13	7,225	13
P.M. Peak Hour (4:30-5:30 p.m.)								
North Bay	Golden Gate Bridge							
	total vehicles/a/	6,500	7,200	11	/f/	/f/	/f/	/f/
	vehicles from Project Area/b/	20	60	0	/f/	/f/	/f/	/f/
	vehicles from Downtown & Vicinity/c/	2,925	2,925	0	/f/	/f/	/f/	/f/
	vehicles from rest of region/d/	3,575	4,275	20	/f/	/f/	/f/	/f/
East Bay	San Francisco – Oakland Bay Bridge							
	total vehicles	9,450	9,700	3	/f/	/f/	/f/	/f/
	vehicles from Project Area/b/	25	30	20	/f/	/f/	/f/	/f/
	vehicles from Downtown & Vicinity	4,700	4,750	2	/f/	/f/	/f/	/f/
	vehicles from rest of region	4,750	4,950	4	/f/	/f/	/f/	/f/

TABLE VI.E.10: P.M. PEAK PERIOD AND P.M. PEAK HOUR HIGHWAY VOLUMES AT SCREENLINES, 1985 AND 2000 (continued)

		1985	2000					
Screenline	Highway	/e/	Alt. A	% Change 1985-2000	Alt. B	% Change 1985-2000	Alt. N	% Change 1985-2000
South Bay	Highway 101							
	total vehicles	6,875	8,000 /i/	16	8,000 /i/	/f/	8,000 /i/	/f/
	vehicles from Project Area/b/	15	75	400	/f/	/f/	/f/	/f/
	vehicles from Downtown & Vicinity	2,825	3,425	21	/f/	/f/	/f/	/f/
	vehicles from rest of region	4,050	4,575	13	/f/	/f/	/f/	/f/
	total vehicles exceeding capacity of 8000		375		350		350	
	I-280							
	total vehicles	4,975	6,075	22	6,050	22	6,050	22
	vehicles from Project Area/b/	10	60	500	30	200	50	300
	vehicles from Downtown & Vicinity	2,050	2,775	35	2,750	35	2,750	35
	vehicles from rest of region	2,925	3,300	13	3,300	13	3,300	13

/a/ Total number of vehicles crossing facility or boundary in direction leading away from Downtown & Vicinity.
/b/ Number of vehicles whose journeys begin in Project Area.
/c/ Number of vehicles whose journeys begin in Downtown & Vicinity, including the Project Area.
/d/ Number of vehicles whose journeys begin anywhere in the region but Downtown & Vicinity.
/e/ Counts discussed in Setting, p. VI.E.39 et seq.
/f/ Volumes would be the same as for Alternative A.
/g/ Projected volumes would exceed peak period capacity of 14,400 vehicles. See discussion on pp. VI.E.85 et seq.
/h/ Projected volumes would exceed peak period capacity of 19,400 vehicles. See discussion on pp. VI.E.89 et seq.
/i/ Projected volumes would exceed hourly capacity of 8,000 vehicles and peak period capacity of 16,000 vehicles. See discussion on pp. VI.E.91 et seq.

SOURCE: Barton-Aschman Associates, Inc.

As travelers from the Downtown & Vicinity are projected to shift to carpools and transit during the p.m. peak period, the percentage of vehicles crossing the Golden Gate Bridge coming from the Downtown & Vicinity would drop from 42% in 1985 to 38% in 2000. This projected shift by travelers from the Downtown & Vicinity to other modes would also tend to shorten the duration of congestion from about four hours projected for the "unconstrained vehicle demand" scenario to about two hours. In comparison, the Golden Gate Bridge operated at capacity for less than one p.m. hour in 1985. (The projected modal shift, which would be numerically similar for all three Alternatives, is discussed on p. VI.E.78.)

San Francisco – Oakland Bay Bridge

On the eastbound lanes of the Bay Bridge, the cumulative travel demand projected from the Downtown & Vicinity and from the rest of the region would use available capacity beyond the 4:00 to 6:00 p.m. period, for about 4.5 hours. In 1985, the Bay Bridge operated at capacity for almost two hours. A slight increase in the Bridge's operational capacity from 1,900 to 1,940 vehicles per hour per lane is anticipated, reflecting the most recent traffic counts, changes in driving habits, and flow and surveillance improvements planned by Caltrans.

Growth in vehicular travel from the Downtown & Vicinity during the p.m. peak period is not projected, as 1) the Bay Bridge is already nearly at capacity during those hours, and 2) travelers from or to the Downtown & Vicinity would have more transit options and carpooling opportunities available than would other travelers. The projected shifts to BART, AC Transit, and ridesharing are discussed on p. VI.E.100.

Throughout the p.m. period of congestion, which would extend beyond the peak hours of 4:00 to 6:00 p.m., the eastbound lanes of the Bay Bridge would be operating at maximum operational capacity. As those lanes are currently operating at LOS E (V/C = 1.0), operating conditions on the Bay Bridge would not change from those existing today. However, the duration of congestion would expand by over two hours. For vehicles traveling eastbound during the p.m. peak period, speeds on the western approach to the Bridge would continue to be approximately 15 to 20 mph (at LOS F), and on the span itself about 30 mph.

Without the projected shifts by Downtown & Vicinity travelers to other modes during the two-hour p.m. peak period, the Bay Bridge would be operating at capacity for over

5.5 hours./77/ As a result of modal shifts by employees in the Downtown & Vicinity, the percentage of p.m. peak period vehicles on the Bay Bridge coming from the Downtown & Vicinity is forecast to decrease slightly from about 46% in 1985 to about 45% in 2000./78/

Only 7% of the 38% increase in "through" vehicular travel demand (i.e., that projected from and to the rest of San Francisco and the region between 1985 and 2000) would be accommodated on the Bay Bridge during the 4:00 to 6:00 p.m. period. There would not be sufficient capacity on the Bay Bridge to accommodate approximately 3,125 "through" vehicles traveling to and from the rest of San Francisco and the region during the 4:00 to 6:00 p.m. period, even if almost no additional vehicle trips are projected from the Downtown & Vicinity.

The following possible changes in travel to and from the rest of San Francisco and the region could result from that capacity constraint; if regional projections of population and employment or travel patterns do not change from the ones used in this analysis. The projected excess vehicle demand could result in shifts to other hours of travel or to other modes.

- Travelers from places in San Francisco outside the Downtown & Vicinity and from northern San Mateo County could attempt to change their times of travel on the Bay Bridge. This would depend on the ability of individual travelers to change either their trip departure or arrival times and on the amount of capacity available on the Bay Bridge before 4:00 p.m. and after 6:00 p.m. However, as the Bay Bridge is projected to be at capacity for about 4.5 hours, substantial numbers of these travelers would not be able to shift to using the Bay Bridge at other hours.

- Travelers from northern and central San Mateo County could attempt to change their route of travel; i.e., via the Hayward - San Mateo Bridge. However, as that bridge is expected to be operating at capacity during the peak two hours, some travelers now capable of using the Bay Bridge but wanting to use the Hayward - San Mateo Bridge would have to travel at other than the peak two hours. Capacity constraints on U.S. 101, S.R. 92, and I-880 would also affect the use of the Hayward - San Mateo Bridge during the two-hour p.m. peak period.

- Travelers from places in San Francisco outside the Downtown & Vicinity and from northern San Mateo County traveling to western Contra Costa and Solano and Napa Counties could attempt to change their route of travel; i.e., via the Golden Gate Bridge. However, as that bridge is expected to be operating at capacity during the peak two hours, those travelers would have to cross the Golden Gate Bridge outside the 4:00 to 6:00 p.m. period.

- All of those travelers could attempt to increase their use of carpools and vanpools, depending on the nature and extent of supportive programs at their work places and the provision of facilities for carpools and vanpools. In order to achieve substantial increases in ridesharing rates, programs and facilities would need to be implemented to make ridesharing more attractive at both the destination and in-journey portions of travel.

- All of those travelers could attempt to increase their use of transit, depending on the availability and convenience of transit services in the region. In some areas of the region, service extensions across existing service boundaries, and additional funding for transit capital projects and operations, would be required to make inter-county transit travel more convenient.

If this duration of p.m. congestion occurred as projected, commute travel on the Bay Bridge would extend for a substantial part of the day, as a.m. commute conditions would be similar to those in the afternoon. The impact analysis assumes that work-related commuters would continue to compete with non-work trips across the Bridge, but that non-work trips during the 4:00 to 6:00 p.m. peak period in 2000 would remain constant from 1985 levels. It is possible, however, that some of those discretionary non-work trips would be made outside the commute hours, thus making some additional capacity available for work trips.

It is possible that the above changes in travel would not occur and that other changes in the regional development scenario would occur instead. If sizeable numbers of additional travelers did not change their time of travel or use other modes, then there could be more changes in where people live and work and/or less employment growth than forecast for this EIR. There would be pressures for people to live closer to where they work. This might require revisions to local zoning to allow more housing development near employment centers. It might also mean that more of the people living in San Francisco or the Peninsula would work in those areas, and that fewer workers there would live in the East Bay. Transportation constraints also could limit employment growth if workers were unwilling or unable to change where they lived or how they travelled to and from work. If this were the case, then there would be less growth than assumed in this analysis.

U.S. 101 at the San Mateo County Line

On the southbound lanes of U.S. 101 at the San Mateo County line, the cumulative travel demand projected from the Downtown & Vicinity and from the rest of the region would use available capacity throughout the 4:00 to 6:00 p.m. peak period. The period of full utilization of capacity would increase from about one hour in 1985 to about 2.5 hours in 2000. U.S. 101 at the San Mateo County line would operate at LOS F during the p.m. peak period. Operating speeds would be approximately 30 mph.

P.m.-peak-period trips from the Downtown & Vicinity crossing the South Bay screenline are projected to grow by 33% between 1985 and 2000. That growth, however, cannot be accommodated within U.S. 101's capacity during the 4:00 to 6:00 p.m. period, as a 13% increase between 1985 and 2000 in vehicles from the rest of the region traveling across this screenline is also projected. As a result, only a 9% increase between 1985 and 2000 in vehicular travel from the Downtown & Vicinity is projected for the two-hour peak period for U.S. 101. Excess vehicular demand from the Downtown & Vicinity on U.S. 101 during the 4:00 to 6:00 p.m. period would be as follows: 1,550 with Alternative A, 1,250 with Alternative B, and 1,150 with Alternative N.

The excess vehicle demand projected for U.S. 101 during the 4:00 to 6:00 p.m. period could be accommodated as follows:

- Travelers from the Downtown & Vicinity could change their time of travel on U.S. 101 so as to cross the San Mateo County line before 4:00 p.m. or after 6:00 p.m., when sufficient capacity is projected to be available. Persons making work-related trips would be more likely to shift to a later time of departure from the Downtown & Vicinity than persons making trips for other purposes. Traveling on U.S. 101 in San Mateo County after 6:00 p.m. would also avoid the peak hours of congestion occurring there.

- Travelers from the Downtown & Vicinity could change their route of travel during the p.m. period to I-280 or surface streets. As discussed on p. VI.E.79, travelers from the Downtown & Vicinity could bypass the U.S.-101/I-280 interchange by using surface streets to enter I-280 south of that freeway-to-freeway interchange and travel southbound on the less congested segments of I-280.

- Travelers from the Downtown & Vicinity could change their mode of travel and shift to BART, CalTrain, SamTrans, vanpools or carpools. As indicated in Table VI.E.13, p. VI.E.98, sufficient capacity is projected for those transit systems to be able to accommodate larger shifts in travel than those required to accommodate the projected levels of excess vehicle demand.

I-280 at the San Mateo County Line

During the p.m. peak period and hour in the year 2000, I-280 at the San Mateo County line would be operating at LOS C (V/C = 0.78 and 0.76, respectively), with speeds of 40 to 45 mph. Operating conditions would be substantially the same for all Alternatives, as the three forecasts of volumes on I-280 are nearly identical. Growth in travel from the rest of the region assigned to I-280 would be the same as for U.S. 101, a 13% increase between 1985 and 2000. As indicated on p. VI.E.79, the U.S.-101/I-280 interchange would constrain growth in I-280's traffic south of the interchange. That "metering" of traffic would create the operating conditions projected for I-280 at the San Mateo County line.

Transit Systems

Forecasts of year 2000 transit riders at screenlines would be similar among Mission Bay Alternatives, except for the South Bay screenline. This conclusion is derived from the peak-period and peak-hour travel forecasts presented in Tables VI.E.11 and VI.E.12, respectively. The forecasts of transit riders are related directly to the highway travel forecasts presented in Table VI.E.10, pp. VI.E.87-VI.E.88 and the transit system capacities presented in Table VI.E.13, p. VI.E.98.

MUNI Screenlines Within San Francisco

Ridership on MUNI from the Downtown & Vicinity during the p.m. peak period is forecast to increase between 1985 and 2000 by the following percentages: approximately 17% to 18% across the Northeast screenline, 13% to 14% across the Northwest screenline, 9% to 10% across the Southwest screenline, and 11% to 13% across the Southeast screenline. Differences among Alternatives in the numbers of MUNI riders across screenlines are not statistically significant, ranging from a maximum of about 1.6% for the Southeast screenline, down to a maximum of about 0.6% for the Northeast screenline. Differences among Alternatives in cumulative MUNI trips are not statistically significant because the Project Area would contribute small shares of transit trips crossing the screenlines. The following approximate percentages of transit trips from the Downtown & Vicinity across each MUNI screenline would be generated by the land uses within the Project Area (excluding transit terminals): 2.2% with Alternative A, 1.2% with Alternative B, and 1.6% with Alternative N. Those percentages reflect the percentages of employment in the Downtown & Vicinity projected to be in the Project Area by the year 2000.

During the 4:30 to 5:30 p.m. peak hour, ridership on MUNI from the Downtown & Vicinity would increase by the following percentages between 1985 and 2000: 17% to 18% across the Northeast screenline, 12% to 13% across the Northwest screenline, 9% to 10% across the Southwest screenline, and 11% to 13% across the Southeast screenline (see Table VI.E.12, pp. VI.E.96-VI.E.97). Differences among Alternatives in peak-hour cumulative trips across MUNI screenlines would not be statistically significant because the Project Area would contribute only a small share of trips on MUNI routes serving the Downtown & Vicinity.

The greatest numbers of outbound riders on MUNI routes crossing each screenline during the p.m. peak period would continue to come from the Downtown & Vicinity, as follows:

TABLE VI.E.11: P.M. PEAK PERIOD OUTBOUND TRANSIT RIDERS AT SCREENLINES, 1985 AND 2000

Screenline	Operator	1985/a/	2000					
			Alt. A	% Change from 1985/b/	Alt. B	% Change from 1985/b/	Alt. N	% Change from 1985/b/
Northeast	Muni							
	total volume	13,300	15,600	17	15,550	17	15,650	18
	volume from Project Area/c/	/d/	300	/e/	175	/e/	225	/e/
	volume from Downtown & Vicinity/f/	11,900	14,000	18	13,950	17	14,050	18
	volume from rest of region/g/	1,400	1,600	14	1,600	14	1,600	14
Northwest	Muni							
	total volume	13,600	15,400	13	15,350	13	15,500	14
	volume from Project Area/c/	/d/	325	/e/	175	/e/	250	/e/
	volume from Downtown & Vicinity	12,850	14,550	13	14,500	13	14,650	14
	volume from rest of region	750	850	14	850	14	850	14
Southwest	Muni							
	total volume	21,500	23,750	10	23,500	9	23,700	10
	volume from Project Area/c/	/d/	500	/e/	275	/e/	375	/e/
	volume from Downtown & Vicinity	20,500	22,600	10	22,350	9	22,550	10
	volume from rest of region	1,000	1,150	14	1,150	14	1,150	14
Southeast	Muni							
	total volume	5,600	6,350	13	6,250	11	6,300	13
	volume from Project Area/c/	/d/	150	/e/	75	/e/	100	/e/
	volume from Downtown & Vicinity	5,300	6,000	13	5,900	11	5,950	13
	volume from rest of region	300	350	14	350	14	350	14
North Bay	Golden Gate Bus							
	total volumes	5,600	11,000	96	10,900	94	10,900	94
	volume from Project Area/c/	/d/	225	/e/	125	/e/	175	/e/
	volume from Downtown & Vicinity	5,150	10,500	103	10,400	101	10,400	101
	volume from rest of region	450	500	14	500	14	500	14
	Golden Gate Ferry							
	total volume	1,200	1,900	59	1,875	56	1,900	59
	volume from Project Area/c/	/d/	50	/e/	25	/e/	25	/e/
	volume from Downtown & Vicinity	1,000	1,650	65	1,625	63	1,650	65
	volume from rest of region	200	250	30	250	30	250	30
East Bay	BART							
	total volumes	24,900	50,550	103	50,100	101	50,300	102
	volume from Project Area/c/	/d/	1,050	/e/	600	/e/	750	/e/
	volume from Downtown & Vicinity	21,900	47,100	115	46,650	113	46,850	114
	volume from rest of region	3,000	3,450	14	3,450	14	3,450	14
	AC Transit							
	total volume	11,600	18,800	62	18,650	61	18,700	61
	volume from Project Area/c/	/d/	400	/e/	225	/e/	275	/e/
	volume from Downtown & Vicinity	10,900	18,000	65	17,850	64	17,900	64
	volume from rest of region	700	800	14	800	14	800	14

(continued)

TABLE VI.E.11: P.M. PEAK PERIOD OUTBOUND TRANSIT RIDERS AT SCREENLINES, 1985 AND 2000 (continued)

			2000					
Screenline	Operator	1985/a/	Alt. A	% Change from 1985/b/	Alt. B	% Change from 1985/b/	Alt. N	% Change from 1985/b/
South Bay	CalTrain							
	total volume	3,500	3,650 /h/	4	3,600 /h/	3	4,600	31
	volume from Project Area/c/	/d/	75	/e/	50	/e/	75	/e/
	volume from Downtown & Vicinity	3,400	3,525	4	3,475	2	4,475	32
	total from rest of region	100	125	14	125	14	125	14
	SamTrans							
	total volumes	2,000	2,850	43	2,800	40	2,600	32
	volume from Project Area/c/	/d/	50	/e/	25	/e/	50	/e/
	volume from Downtown & Vicinity	1,825	2,650	45	2,600	42	2,400	32
	volume from rest of region	175	200	14	200	14	200	14
	BART							
	total volume/h/	11,000	12,900	17	12,800	16	12,600	15
	volume from Project Area/c/	/d/	250	/e/	150	/e/	175	/e/
	volume from Downtown & Vicinity	9,900	11,650	18	11,550	17	11,350	15
	volume from rest of region	1,100	1,250	14	1,250	14	1,250	14

/a/ Volumes consistent with the data listed in Setting Table VI.E.6, p. VI.E.35, were provided by individual transit operators for the 1984-1986 time period. Barton-Aschman Associates, Inc. created the estimates of 1988 volumes of riders traveling from the Project Area, Downtown & Vicinity or the rest of the region.

/b/ Rounding off volumes to the nearest 25 or 50 was done so as not to overstate the accuracy of the projections. The percent changes are based on the unrounded numbers.

/c/ Volumes from the Project Area describe those travelers who begin their trip at a land use located within the Project Area.

/d/ As each of these volumes is closer to 0 than to 25 when rounded off, the rounded off volumes are not shown.

/e/ These percentages cannot be calculated without overstating the accuracy of the projections.

/f/ Volumes from Downtown & Vicinity describe those travelers who begin their trip at a land use located within Downtown & Vicinity, including the Project Area.

/g/ Volumes from the rest of the region describe those travelers who begin their trip at a land use located in any area of San Francisco outside Downtown & Vicinity or in any county outside San Francisco.

/h/ These volumes are based on the 22% reduction in CalTrain ridership associated with the relocation of the San Francisco terminal. For additional discussion about this projection, see pp. VI.E.101-VI.E.103.

/i/ The volumes shown would occur on westbound trains leaving Civic Center station.

SOURCE: Barton-Aschman Associates, Inc.

TABLE VI.E.12: P.M. PEAK HOUR OUTBOUND TRANSIT RIDERS AT SCREENLINES, 1985 AND 2000

Screenline	Operator	1985/a/	2000 Alt. A	% Change from 1985/b/	2000 Alt. B	% Change from 1985/b/	2000 Alt. N	% Change from 1985/b/
Northeast	Muni							
	total volume	7,400	8,675	17	8,650	17	8,700	17
	volume from Project Area/c/	/d/	200	/e/	100	/e/	150	/e/
	volume from Downtown & Vicinity/f/	7,075	8,300	17	8,275	17	8,325	18
	volume from rest of region/g/	325	375	14	375	14	375	14
Northwest	Muni							
	total volume	8,700	9,800	13	9,800	12	9,875	14
	volume from Project Area/c/	/d/	200	/e/	125	/e/	150	/e/
	volume from Downtown & Vicinity	7,950	8,950	13	8,950	12	9,025	13
	volume from rest of region	750	850	14	850	14	850	14
Southwest	Muni							
	total volume	12,250	13,500	10	13,400	9	13,500	10
	volume from Project Area/c/	/d/	275	/e/	150	/e/	225	/e/
	volume from Downtown & Vicinity	11,750	12,900	10	12,800	9	12,900	10
	volume from rest of region	500	600	14	600	14	600	14
Southeast	Muni							
	total volume	3,250	3,675	13	3,625	10	3,650	11
	volume from Project Area/c/	/d/	75	/e/	50	/e/	50	/e/
	volume from Downtown & Vicinity	3,000	3,400	13	3,350	11	3,375	12
	volume from rest of region	250	275	14	275	14	275	14
North Bay	Golden Gate Bus							
	total volume	3,800	7,450	96	7,400	95	7,400	95
	volume from Project Area/c/	/d/	150	/e/	100	/e/	125	/e/
	volume from Downtown & Vicinity	3,450	7,050	104	7,000	103	7,000	103
	volume from rest of region	350	400	14	400	14	400	14
	Golden Gate Ferry							
	total volume	900	1,425	56	1,400	56	1,400	56
	volume from Project Area/c/	/d/	25	/e/	25	/e/	25	/e/
	volume from Downtown & Vicinity	750	1,225	63	1,200	60	1,200	60
	volume from rest of region	150	200	33	200	33	200	33
East Bay	BART							
	total volume	14,200	29,350	107	29,225	106	29,500	108
	volume from Project Area	/d/	625	/e/	350	/e/	450	/e/
	volume from Downtown & Vicinity	13,100	28,075	114	27,950	113	28,225	115
	volume from rest of region	1,100	1,275	14	1,275	14	1,275	14

(continued)

TABLE VI.E.12: P.M. PEAK HOUR OUTBOUND TRANSIT RIDERS AT SCREENLINES, 1985 AND 2000 (continued)

			2000					
Screenline	Operator	1985/a/	Alt. A	% Change from 1985/b/	Alt. B	% Change from 1985/b/	Alt. N	% Change from 1985/b/
East Bay	AC Transit							
	total volume	7,800	12,625	62	12,575	61	12,700	63
	volume from Project Area/c/	/d/	275	/e/	150	/e/	200	/e/
	volume from Downtown & Vicinity	7,400	12,150	64	12,100	64	12,225	65
	volume from rest of region	400	475	14	475	14	475	14
South Bay	CalTrain							
	total volume	2,300	2,400 /h/	4	2,400 /h/	4	3,050	33
	volume from Project Area/c/	/d/	50	/e/	25	/e/	50	/e/
	volume from Downtown & Vicinity	2,225	2,300	3	2,300	3	2,950	33
	volume from rest of region	75	100	14	100	14	100	14
	SamTrans							
	total volume	1,600	2,425	52	2,400	50	2,100	31
	volume from Project Area/c/	/d/	50	/e/	50	/e/	25	/e/
	volume from Downtown & Vicinity	1,475	2,275	54	2,250	53	1,950	32
	volume from rest of region	125	150	14	150	15	150	14
	BART							
	total volume/i/	6,500	7,850	21	7,775	20	7,450	15
	volume from Project Area/c/	/d/	150	/e/	100	/e/	100	/e/
	volume from Downtown & Vicinity	5,925	7,200	22	7,125	20	6,800	15
	volume from rest of region	575	650	14	650	14	650	14

/a/ Volumes consistent with the data listed in Setting Table VI.E.6, p. VI.E.35 were provided by individual transit operators for the 1984-1986 time period. Barton-Aschman Associates, Inc. created the estimates of 1985 volumes of riders traveling from the Project Area, Downtown & Vicinity or the rest of the region.

/b/ Rounding off volumes to the nearest 25 or 50 was done so as not to overstate the accuracy of the projections. The percent changes are based on the rounded numbers.

/c/ Volumes from the Project Area describe those travelers who begin their trip at a land use, not a transit terminal, located within the Project Area.

/d/ As each of these volumes is closer to 0 than to 25 when rounded off, the rounded off volumes are not shown.

/e/ These percentages cannot be calculated without overstating the accuracy of the projections.

/f/ Volumes from Downtown & Vicinity describe those travelers who begin their trip at a land use located within Downtown & Vicinity, including the Project Area.

/g/ Volumes from the rest of the region describe those travelers who begin their trip at a land use located in any area of San Francisco outside Downtown & Vicinity or in any county outside San Francisco.

/h/ These volues are based on the 22% reduction in CalTrain ridership associated with the relocation of the San Francisco terminal. For aditional discussion about this project, see pp. VI.E.101-VI.E.103.

/i/ The volumes shown would occur on westbound trains leaving Civic Center station.

SOURCE: Barton-Aschman Associates, Inc.

TABLE VI.E.13: CUMULATIVE OUTBOUND TRANSIT DEMAND AND CAPACITY AT SCREENLINES, 2000

		PM Peak Hour							PM Peak Period						
Screenline	Transit Operator	Capa-city/a/	Demand/b/ Alternatives A, B and N	D/C/c/	LOS/d/	Demand	D/C	LOS	Capa-city/a/	Demand/b/ Alternatives A, B and N	D/C/c/	LOS/d/	Demand	D/C	LOS
Northeast	Muni	7,000	8,675	1.24	D				12,100	15,600	1.29	E			
Northwest	Muni	7,700	9,800	1.27	E				13,300	15,400	1.16	D			
Southwest	Muni	13,200	13,500	1.02	D				22,700	23,750	1.05	D			
Southeast	Muni	3,050	3,675	1.21	D				5,200	6,350	1.22	D			
North Bay	Golden Gate														
	Bus	7,200	7,450	1.04	D				11,100	11,000	0.99	C			
	Ferry	1,900	1,425	0.75	B				3,200	1,900	0.59	B			
East Bay															
	AC Transit	9,700	12,625	1.30	E				14,700	18,800	1.28	E			
	BART	18,000	29,350	1.63	F				30,900	50,550	1.64	F			
		Alternatives A and B				Alternative N			Alternatives A and B				Alternative N		
South Bay															
	BART/e/	9,000	7,850	0.87	C	7,450	0.82	C	18,000	12,900	0.72	B	12,600	0.70	B
	CalTrain	4,600	2,400	0.52	B	3,050	0.66	B	6,900	3,650	0.53	B	4,600	0.67	B
	SamTrans	3,700	2,425	0.66	B	2,100	0.57	B	5,100	2,850	0.56	B	2,600	0.51	B

/a/ For consistency of this analysis, the unit of seats has been used to define capacity (see pp. VI.E.103-VI.E.104 for more discussion).

/b/ Demand volumes would be similar for the three Alternatives, except for the South Bay screenline. For all screenlines but the South Bay screenlines, demand volumes are for forecasts with Alternative A. The demand volumes forecast to be generated by the land uses within Mission Bay are presented in Tables VI.E.11 and VI.E.12.

/c/ Demand to capacity ratio (D/C) equal passengers-per-seat provided.

/d/ Level of Service, as defined in Transportation Research Board Circular 212. See Appendix E. Table XIV.E.4, p. XIV.E.20 for a description of Level of Service conditions.

/e/ Includes travelers to southeast and southwest San Francisco and to San Mateo County, measured on westbound trains leaving Civic Center Station.

SOURCE: Barton-Aschman Associates, Inc., based on projections of capacity supplied by the transit operators for use in the Mission Bay and South of Market EIRs. The letters are on file at the San Francisco Department of City Planning.

approximately 90% of MUNI riders across the Northeast screenline, 94% across the Northwest screenline, 95% across the Southwest screenline, and 94% across the Southeast screenline. Increases in MUNI's ridership from 1985 to 2000 would lag behind increases in employment in the Downtown & Vicinity because in 2000 smaller percentages of employees in the Downtown & Vicinity would reside in San Francisco (see Appendix C. Housing and Population, Table XIV.C.10, p. VI.C.25).

Golden Gate Transit - Buses

Ridership on Golden Gate buses is forecast to approximately double between 1985 and 2000, with differences among Alternatives being statistically insignificant. This very large growth in ridership is forecast as a result of a combination of factors that affect total travel demand across the Golden Gate screenline:

- Growth between 1985 and 2000 of about 30% in employment in the Downtown & Vicinity, plus
- Increase between 1985 and 2000 of about 9% in the percentage of employees of the Downtown & Vicinity residing in the North Bay, plus
- A projected modal shift by 2000 of about 41% in peak-period use of Golden Gate Transit buses, associated with a 32% decrease in vehicle usage by travelers from the Downtown & Vicinity (see Table VI.E.7, p. VI.E.77), plus
- Growth between 1985 and 2000 of about 14% in ridership from outside the Downtown & Vicinity.

The percent of peak-period riders on Golden Gate buses whose journeys begin in the Downtown & Vicinity would increase from about 92% in 1985 to about 95% in 2000, as growth in ridership from the Downtown & Vicinity is forecast to outpace growth in ridership from other areas. As indicated in Tables VI.E.11 and VI.E.12, pp. VI.E.94-VI.E.97, differences among Alternatives in peak period and peak hour forecasts would be statistically insignificant.

Golden Gate Transit - Ferries

Between 1985 and 2000, total ridership on Golden Gate ferries is forecast to increase by about 56% to 59% and ridership from the Downtown & Vicinity by about 60% to 65% during the peak period and peak hour among the three Alternatives. Ridership on Golden Gate ferries would not grow as rapidly as ridership on Golden Gate buses because most areas of Marin and Sonoma Counties are served more directly by bus routes, bus service would be more frequent, and total travel times on buses would generally be shorter than those for ferries. Notwithstanding these differences between bus and ferry services, ridership on Golden Gate ferries would increase as a result of the increase projected in peak-period travel from both the Downtown & Vicinity and elsewhere in San Francisco, and of the aforementioned vehicular capacity constraints on the Golden Gate Bridge.

Ridership on the Red and White Fleet ferries to Tiburon, which would be lower than on Golden Gate ferries, would also increase by smaller amounts, as statistically significant modal shifts are not anticipated for the Red and White ferries.

BART - TransBay

Total ridership on BART across the East Bay screenline is forecast to increase by 101% to 103% during the peak period and by 106% to 108% during the peak hour, with the minor differences among Alternatives presented in Tables VI.E.11 and VI.E.12, pp. VI.E.94-VI.E.97. This very large growth in BART's ridership is forecast as a result of a combination of projections for the components of total travel demand across the East Bay screenline:

- Growth between 1985 and 2000 of about 30% in employment in the Downtown & Vicinity, plus
- Increase between 1985 and 2000 of about 28% in the percentage of employees of the Downtown & Vicinity residing in the East Bay, plus
- A projected modal shift by 2000 of about 26% in the use of BART, associated with a 37% decrease in vehicle usage by travelers from the Downtown & Vicinity (see Table VI.E.7, p. VI.E.77), plus
- Growth between 1985 and 2000 of about 14% in ridership from outside the Downtown & Vicinity.

The increases in total BART ridership presented above would be attributed predominantly to increases in BART ridership by travelers from the Downtown & Vicinity, who have better access to BART, and therefore would have a higher propensity to shift to BART than travelers from other areas crossing the East Bay screenline. During the p.m. peak period, BART ridership attributed to travelers from the Downtown & Vicinity is forecast to increase by 113% to 115%, with the minor differences among Alternatives presented in Tables VI.E.11 and VI.E.12, pp. VI.E.94-VI.E.97.

AC Transit

Total ridership on AC Transit is projected to increase far less than ridership on BART because of the assumed limitation on increasing AC Transit's TransBay services (either routes or frequencies). As a result, AC Transit's ridership is forecast to increase by 64% to 65% during the peak period, with this increase due only to growth in employment in the Downtown & Vicinity and in the share of employees of the Downtown & Vicinity residing in the East Bay.

CalTrain, BART (South Bay), and SamTrans

Differences in transit ridership among Alternatives would be statistically significant for the South Bay screenline, in contrast to the conditions forecast for the other screenlines. The South Bay screenline is the only regional screenline where the land use and transportation features of the Alternatives would directly affect the relative travel times among travel modes crossing the screenline./79/ Alternatives A and B would not have the same location for the CalTrain terminal as Alternative N, and that location difference would affect ridership on CalTrain.

A number of studies have been published recently that directly (or indirectly) evaluate the effects on CalTrain ridership that would result from relocation of the San Francisco CalTrain terminal from its current location at Fourth and Townsend Streets (where it would remain with Alternative N) to a new site about one-half mile to the southwest at Seventh and Channel Streets (where it is assumed to be with Alternatives A and B)./58/ In summary, the three studies indicated a decrease in ridership ranging from 5% to 22% if the CalTrain Station were moved to Seventh and Channel Streets. In order to incorporate the most conservative assumption in the CalTrain analysis (which would result in higher impacts on freeways serving the South Bay), the projected 22% reduction in CalTrain ridership presented in the CalTrain Station Locations, Special Study for Mission Bay, is used in this EIR analysis to forecast the differences among the Alternatives in highway and transit travel across the South Bay screenline.

Future ridership on CalTrain to or from San Francisco would be affected by growth in downtown employment, Caltrans' plans for increasing CalTrain service, the degree of highway congestion throughout the Peninsula affecting travel to San Francisco, and the travel time change resulting from changing the location of the San Francisco terminal./80/

CalTrain ridership would be lower with Alternatives A and B than with Alternative N, as a result of increased distance from the most intensive employment areas within the Downtown & Vicinity, and relative travel times among competing modes that would accompany relocation of the CalTrain terminal. Approximately half of the San Francisco ridership lost to CalTrain would be reflected in increased vehicle trips, the remainder in increased use of BART and SamTrans./81/

The two other recent projections of CalTrain ridership provide additional insights into the effects that changes in accessibility and SamTrans service will have on CalTrain ridership to downtown San Francisco. One of those studies, performed using the same regional travel forecasting model as in the CalTrain Station Locations (study), but different CalTrain service assumptions, does not report a direct difference in CalTrain ridership between the current and the relocated terminals./82/ However, the forecasts in that other study imply about an 11% drop in ridership due solely to the change in station location. That percentage compares directly to about 8.5% (of the 22% total change) of the CalTrain Station Locations (study).

The last study, performed using a different procedure, reported that CalTrain's ridership would be 5% to 6% lower with the San Francisco terminal relocated to Seventh and Channel Streets./83/ That study, which used what is called the "Quick-Response" technique and not MTC's regional travel model as did the two studies above, also did not consider changes in ridership due to SamTrans express bus services competing with CalTrain. Accounting for the loss of ridership from CalTrain to competing SamTrans buses if the terminal were relocated to Seventh and Channel Streets represents about 12.5% (of the 22% total drop) projected in the CalTrain Station Locations (study)./84/

Ridership levels across the South Bay screenline on CalTrain, BART and SamTrans are forecast to increase with Alternative N solely as a result of growth in travel from the Downtown & Vicinity. Shifts from vehicular travel to transit were not assumed, because of the projection that U.S. 101 and I-280 at the San Mateo County line would accommodate vehicular demand. With Alternative N, peak-period ridership on CalTrain, SamTrans and BART trains crossing the San Mateo County line is forecast to increase by about 32% (see Tables VI.E.11 and VI.E.12, pp. VI.E.94-VI.E.97)./85/

With Alternatives A and B, ridership on SamTrans is forecast to increase between 1985 and 2000 by about 40% to 43% during the peak period and by 50% to 52% during the peak hour. Ridership on BART across the San Mateo County line is forecast to increase by similar percentages. Conversely, ridership on CalTrain is forecast to increase by only about 3% to 4% between 1985 and 2000 with Alternatives A and B, because of the assumed relocation of the San Francisco terminal to Seventh and Channel Streets.

With all Alternatives, the primary component of total ridership at the South Bay screenline would continue to be ridership emanating from the Downtown & Vicinity. In the year 2000, approximately 96% of CalTrain riders, 93% of SamTrans riders, and 90% of BART riders crossing the South Bay screenline would be from the Downtown & Vicinity.

Levels of Transit Service

Changes in transit travel demand and capacity projected to occur between 1985 and 2000 would create new Levels of Transit Service at the screenlines. (The concept of transit LOS is described in Appendix E. p. XIV.E.16.) With the unit of seats used as the consistent unit of capacity, the following changes in levels of transit service are projected, and presented in Table VI.E.13, p. VI.E.98:

- LOS on MUNI trolley coaches, buses, streetcars and Metro trains crossing screenlines within San Francisco would remain about the same as in 1985. LOS D would occur at all screenlines during the peak hour and period, except that across the Northeast screenline during the peak period and across the Northwest screenline during the peak hour the LOS would degrade from D in 1985 to E in 2000. (At LOS D, up to 25% of all passengers would be standing, and at LOS E, between 25 and 50% of all passengers would be standing.)

- Across the Golden Gate screenline, the LOS on ferries would remain good as in 1985 (B), but the LOS on Golden Gate buses would degrade from B in 1985 to D in 2000.

- Across the East Bay screenline, peak-period and peak-hour LOS would degrade for both BART and AC Transit. On AC Transit, the LOS would degrade from C (judged adequate) in 1985 to E (crowded) in 2000, while BART's LOS would worsen from E to F (jammed).

- Across the South Bay screenline, LOS would remain about the same as in 1985, with projected improvements in LOS as a result of anticipated increases in capacity. CalTrain and SamTrans would be operating at LOS B during the peak period with all Alternatives. While BART's LOS is projected to degrade from B to C throughout the peak period, that projection is so sensitive to BART's actual recycling of TransBay trains that this is not a significant change. Also during the peak hour, SamTrans' LOS would improve from C in 1985 to B in 2000 because SamTrans is anticipating increases in express bus service to San Francisco, unless CalTrain is extended into downtown San Francisco.

As discussed in the Setting, not all transit operators use seats as their measure of capacity. Most transit operators assume that some number of standees is to be expected during peak load periods. That is why those transit operators use the concept of load factor (which measures seated and standing spaces) to define when scheduling changes are required to relieve overcrowding. MUNI is also proposing to replace existing trolley coaches and buses with articulated (longer) trolley coaches and trolley buses, and in some cases with streetcars. According to MUNI, articulated buses and trolley coaches have a passenger-carrying capacity that is 33% greater than that of standard buses, and light rail vehicles have a capacity approximately 100% greater than that of standard buses./86/ How much those capacity increases, measured in passenger-carrying spaces, would be greater than capacity increases measured in seats cannot be determined until MUNI prepares route-specific vehicle deployment plans.

Projected LOS would not meet load-factor-service policies for Golden Gate buses during the peak hour, and for AC Transit buses and BART throughout the peak period. Golden Gate bus trips are not intended to carry standees and the projected demand would result in persons standing on some bus trips during the peak hour and peak period. AC Transit modifies schedules on its TransBay bus routes when a standard of 1.25 persons per seat is exceeded, and BART currently strives to deploy sufficient trains and cars per train to stay at or below 1.5 persons per seat (see Mitigations pp. VI.E.214-VI.E.217).

BUILD-OUT/2020 SCREENLINE TRAVEL EFFECTS

To describe the travel impacts that would occur at build-out of the Mission Bay Alternatives, estimates of travel that would occur in 2020 were prepared. While the land use components of the Mission Bay Alternatives provide a direct basis for estimating travel to and from the Project Area at build-out, extrapolations of available regional forecasts of employment, population and travel were required to create cumulative travel estimates for the year 2020. For the reasons presented on pp. VI.E.51, the travel estimates for 2020 are based on the same capacities projected for regional transit and highway systems for the year 2000. The year 2020 travel analysis is different from that done for the year 2000, because the comparisons of year 2020 demand estimates to year 2000 capacities are used to recommend the types and magnitudes of transportation capacity increase required beyond the "reasonably assured capacities" projected for 2000. Those measures are summarized in this impacts analysis and described in detail in Mitigation, p. VI.E.217.

Travel by persons residing in the Project Area would grow substantially between 1985 and 2020 with all Alternatives, and travel by residents of the Project Area would grow substantially with Alternatives A and B. However, differences in growth in travel to or from all of the Downtown & Vicinity would be smaller among the Alternatives, because many of the Project Area trips would remain in the Downtown & Vicinity. Travel projections in the year 2020 for the Mission Bay Alternatives are presented by mode at each of the screenlines.

Projections of future travel by residents and non-residents of the Downtown & Vicinity and projections of changes in travel demand between 1985 and 2020 for that area or for the Project Area cannot be used alone to describe changes in travel at screenlines. Some of the reasons were given previously for the year 2000 forecasts on pp. VI.E.71-VI.E.74.

To identify increases in capacity required between the years 2000 and 2020, forecasts of year 2020 highway and transit travel demand are compared to highway and transit travel capacity anticipated for the year 2000. The forecasts of year 2020 travel demand are therefore unconstrained by capacity, except as discussed below.

Highways

As noted on pp. VI.E.80-VI.E.82, by the year 2000 the Golden Gate Bridge, the San Francisco - Oakland Bay Bridge, and U.S. 101 at the San Mateo County line would operate at capacity throughout the 4:00 to 6:00 p.m. peak period. The Golden Gate Bridge would operate at capacity for about two hours, the Bay Bridge for about 4.5 hours, and U.S. 101 at the San Mateo County line for about 2.5 hours. I-280 would operate below capacity at the San Mateo County line, even during the peak hour; however, at its interchange with U.S. 101, I-280 would operate at capacity during the 4:00 to 6:00 p.m. peak period.

The year 2020 travel projections assume the same modal shares as assumed to result in 2000, with no further changes in modal shares assumed between 2000 and 2020. Therefore, the highway travel demand projections for the year 2020 indicate how much additional capacity would be required, based on the duration of the peak congestion period projected to occur by 2020. (Throughout this analysis, "congestion period" has been used to refer to the time period when the number of vehicles traveling on a highway segment would approximately equal the operational capacity of the highway.) The year 2020 projections are presented in Table VI.E.14 (changes between 1985 and 2020) and Table VI.E.15 (changes between 2000 and 2020), with the conclusions from the forecasts presented below.

The highway travel demand projections for the year 2020, unlike the forecasts for the year 2000, would differ (slightly) among Alternatives because the year 2020 projections are not constrained by capacity. The cumulative travel forecasts are based on separate projections of travel across each screenline from the Downtown & Vicinity and from the rest of the region ("through" travel). The growth in vehicular travel from the

TABLE VI.E.14: P.M. PEAK PERIOD AND P.M. PEAK HOUR HIGHWAY VOLUMES AT SCREENLINES, 1985 AND 2020

			2020					
Screenline	Highway	1985 /e/	Alt. A	% Change 1985–2020	Alt. B	% Change 1985–2020	Alt. N	% Change 1985–2020
P.M. Peak Period (4:00-6:00 p.m.)								
North Bay	Golden Gate Bridge							
	total vehicles/a/	12,800	16,350 /f/	28	16,000 /f/	25	16,300 /f/	27
	vehicles from Project Area/b/	30	325	983	100	233	225	650
	vehicles from Downtown & Vicinity/c/	5,380	6,550	22	6,200	15	6,500	21
	vehicles from rest of region/d/	7,420	9,800	32	/g/		/g/	
	total vehicles exceeding capacity of 14,400	-1,600	1,950		1,600		1,900	
East Bay	San Francisco-Oakland Bay Bridge							
	total vehicles	18,700	25,250 /h/	35	24,950 /h/	33	25,200 /h/	35
	vehicles from Project Area	50	475	850	125	150	350	600
	vehicles from Downtown & Vicinity	8,640	9,750	13	9,450	9	9,700	12
	vehicles from rest of region	10,060	15,500	54	/g/		/g/	
	total vehicles exceeding capacity of 19,400	-700	5,850		5,550		5,800	
South Bay	Highway 101							
	total vehicles	14,350	20,400 /i/	42	19,625 /i/	37	20,000 /i/	39
	vehicles from Project Area	30	450	1,400	100	233	300	900
	vehicles from Downtown & Vicinity	5,450	9,000	65	8,225	51	8,600	58
	vehicles from rest of region	8,900	11,400	28	/g/		/g/	
	total vehicles exceeding capacity of 16,000	-1,650	4,400		3,625		4,000	
	I-280							
	total vehicles	10,325	14,675	42	14,125	37	14,400	39
	vehicles from Project Area	20	325	1,525	75	275	225	1,025
	vehicles from Downtown & Vicinity	3,925	6,475	65	5,925	51	6,200	58
	vehicles from rest of region	6,400	8,200	28	/g/		/g/	
P.M. Peak Hour (4:30-5:30 p.m.)								
North Bay	Golden Gate Bridge							
	total vehicles	6,500	8,275 /j/	28	8,075 /j/	24	8,250 /j/	33
	vehicles from Project Area	20	175	775	50	150	125	525
	vehicles from Downtown & Vicinity	2,925	3,550	22	3,350	15	3,525	21
	vehicles from rest of region	3,575	4,725	32	/g/		/g/	
	total vehicles exceeding capacity of 7,200	-700	1,075		875		1,050	

(continued)

TABLE VI.E.14: P.M. PEAK PERIOD AND P.M. PEAK HOUR HIGHWAY VOLUMES AT SCREENLINES, 1985 AND 2020 (continued)

Screenline	Highway	1985 /e/	2020 Alt. A	 % Change 1985-2020	 Alt. B	 % Change 1985-2020	 Alt. N	 % Change 1985-2020
East Bay	San Francisco-Oakland Bay Bridge							
	total vehicles	9,450	12,675 /k/	34	12,500 /k/	32	12,625 /k/	34
	vehicles from Project Area	25	275	1,000	75	200	175	600
	vehicles from Downtown & Vicinity	4,700	5,325	13	5,150	9	5,275	12
	vehicles from rest of region	4,750	7,350	54	/g/		/g/	
	total vehicles exceeding capacity of 9,700	250	2,925		2,800		2,875	
South Bay	Highway 101							
	total vehicles	6,875	9,850 /l/	43	9,475 /l/	38	9,650 /l/	40
	vehicles from Project Area	15	225	1,400	50	233	150	900
	vehicles from Downtown & Vicinity	2,825	4,650	65	4,275	51	4,450	58
	vehicles from rest of region	4,050	5,200	28	/g/		/g/	
	total vehicles exceeding capacity of 8,000	1,125	1,850		1,475		1,650	
	I-280							
	total vehicles	4,975	7,125	43	6,850	38	6,975	40
	vehicles from Project Area	10	175	1,650	50	400	125	1,150
	vehicles from Downtown & Vicinity	2,050	3,375	65	3,100	51	3,225	58
	vehicles from rest of region	2,925	3,750	28	/g/		/g/	

/a/ Forecast of total number of vehicles that would attempt to cross facility, in direction leading away from Downtown & Vicinity, if modal shares were as for year 2000 (adjusted).
/b/ Number of vehicles whose journeys begin in Project Area.
/c/ Number of vehicles whose journeys begin in Downtown & Vicinity, including the Project Area.
/d/ Number of vehicles whose journeys begin anywhere in the region but Downtown & Vicinity.
/e/ Counts discussed in Setting, pp. VI.E.39-VI.E.43.
/f/ Projected volumes would exceed peak period capacity of 14,400 vehicles. See discussion on pp. VI.E.110-VI.E.111.
/g/ Volumes would be the same as for Alternative A.
/h/ Projected volumes would exceed peak period capacity of 19,400. See discussion on pp. VI.E.111-VI.E.113.
/i/ Projected volumes would exceed peak period capacity of 16,000 vehicles. See discussion on pp. VI.E.113-VI.E.114.
/j/ Projected volume would exceed peak hour capacity of 7,200. See discussion on pp. VI.E.110-VI.E.111.
/k/ Projected volume would exceed peak hour capacity of 9,700. See discussion on pp. VI.E.111-VI.E.113.
/l/ Projected volumes would exceed hourly capacity of 8,000 vehicles. See discussion on pp. VI.E.113-VI.E.114.

SOURCE: Barton-Aschman Associates

TABLE VI.E.15: P.M. PEAK PERIOD AND P.M. PEAK HOUR HIGHWAY VOLUMES AT SCREENLINES, 2000 AND 2020

			2020					
			Alternative A		Alternative B		Alternative N	
Screenline	Highway	2000 /e/	2020	% Change 2000-2020	2020	% Change 2000-2020	2020	% Change 2000-2020
P.M. Peak Period (4:00-6:00 p.m.)								
North Bay	Golden Gate Bridge							
	total vehicles/a/	14,400	16,350 /f/	14	16,000 /f/	11	16,300 /f/	13
	vehicles from Project Area/b/	120	325	170	100	33	225	125
	vehicles from Downtown & Vicinity/c/	5,500	6,550	19	6,200	13	6,500	18
	vehicles from rest of region/d/	8,900	9,800	10	/g/	--	/g/	--
	total vehicles exceeding capacity of 14,400	--	1,950	--	1,600	--	1,900	--
East Bay	San Francisco-Oakland Bay Bridge							
	total vehicles	19,400	25,250 /h/	30	24,950 /h/	29	25,200 /h/	30
	vehicles from Project Area	50	475	850	125	25	350	133
	vehicles from Downtown & Vicinity	8,640	9,750	13	9,450	9	9,700	12
	vehicles from rest of region	10,760	15,500	44	/g/	--	/g/	--
	total vehicles exceeding capacity of 19,400	3,125	5,850	--	5,550	--	5,800	--
South Bay	Highway 101							
	total vehicles	16,000	20,400 /i/	28	19,625 /i/	23	20,000 /i/	25
	vehicles from Project Area	130	450	246	175	35	300	131
	vehicles from Downtown & Vicinity	5,950	9,000	51	8,225	38	8,600	45
	vehicles from rest of region	10,050	11,400	13	/g/	--	/g/	--
	total vehicles exceeding capacity of 16,000	/j/	4,400	--	3,625	--	4,000	--
	I-280							
	total vehicles	12,450	14,675	18	14,125	14	14,400	18
	vehicles from Project Area	120	325	170	150	25	225	181
	vehicles from Downtown & Vicinity	5,225	6,475	24	5,925	14	6,200	24
	vehicles from rest of region	7,225	8,200	13	/g/	--	/g/	--
P.M. Peak Hour (4:30-5:30 p.m.)								
North Bay	Golden Gate Bridge							
	total vehicles	7,200	8,275 /k/	15	8,075 /k/	12	8,250 /k/	15
	vehicles from Project Area	60	175	192	75	25	125	108
	vehicles from Downtown & Vicinity	2,925	3,550	21	3,350	14	3,525	21
	vehicles from rest of region	4,275	4,725	11	/g/	--	/g/	--
	total vehicles exceeding capacity of 7,200	--	1,075	--	875	--	1,050	--

(continued)

TABLE VI.E.15: P.M. PEAK PERIOD AND P.M. PEAK HOUR HIGHWAY VOLUMES AT SCREENLINES, 2000 AND 2020 (continued)

			2020					
			Alternative A		Alternative B		Alternative N	
Screenline	Highway	2000 /e/	2020	% Change 2000-2020	2020	% Change 2000-2020	2020	% Change 2000-2020
East Bay	San Francisco-Oakland Bay Bridge							
	total vehicles	9,700	12,675 /l/	30	12,500 /l/	29	12,625 /l/	30
	vehicle from Project Area	30	275	817	75	150	175	483
	vehicles from Downtown & Vicinity	4,750	5,325	12	5,150	8	5,275	11
	vehicles from rest of region	4,950	7,350	48	/g/	--	/g/	--
	total vehicles exceeding capacity of 9,700	--	2,925	--	2,800	--	2,875	--
South Bay	Highway 101							
	total vehicles	8,000	9,850 /m/	23	9,475 /m/	18	9,650 /m/	21
	vehicles from Project Area	75	225	200	125	70	150	100
	vehicles from Downtown & Vicinity	3,425	4,650	36	4,275	25	4,450	30
	vehicles from rest of region	4,575	5,200	14	/g/	--	/g/	--
	total vehicles exceeding capacity of 8,000	/n/	1,850	--	1,475	--	1,650	--
	I-280							
	total vehicles	6,075	7,125	17	6,850	13	6,975	15
	vehicles from Project Area	60	175	192	50	67	125	150
	vehicles from Downtown & Vicinity	2,775	3,375	22	3,100	13	3,225	17
	vehicles from rest of region	3,300	3,750	14	/g/	--	/g/	--

/a/ Forecast of total number of vehicles that would attempt to cross facility, in direction leading away from Downtown & Vicinity, if modal shares were as for year 2000 (adjusted).
/b/ Number of vehicles whose journeys begin in Project Area.
/c/ Number of vehicles whose journeys begin in Downtown & Vicinity, including the Project Area.
/d/ Number of vehicles whose journeys begin anywhere in the region but Downtown & Vicinity.
/e/ Projected volumes would be identical among all three Alternatives, except for I-280 and the Project Area's volumes across all screenlines.
/f/ Projected volumes would exceed peak period capacity of 14,400 vehicles. See discussion on pp. VI.E.110-VI.E.111.
/g/ Volumes would be the same as for Alternative A.
/h/ Projected volumes would exceed peak period capacity of 19,400. See discussion on pp. VI.E.111-VI.E.113.
/i/ Projected volumes would exceed peak period capacity of 16,000 vehicles. See discussion on pp. VI.E.113-VI.E.114.
/j/ 1550 with Alternative A, 1250 with Alternative B, and 1050 with Alternative N.
/k/ Projected volume would exceed peak hour capacity of 7,200. See discussion on pp. VI.E.110-VI.E.111.
/l/ Projected volume would exceed peak hour capacity of 9,700. See discussion on pp. VI.E.111-VI.E.113.
/m/ Projected volumes would exceed hourly capacity of 8,000 vehicles. See discussion on pp. VI.E.113-VI.E.114.
/n/ 375 with Alternative A, and 350 with Alternatives B and N.

SOURCE: Barton-Aschman Associates, Inc.

Downtown & Vicinity (including the Project Area) between 2000 and 2020 is based on the same percentages of vehicular transit and ridesharing travel assumed for travelers from the Downtown & Vicinity for the year 2000.

Although p.m. peak-hour vehicular demand for the year 2020 is shown in some cases to exceed p.m. peak-hour vehicular capacity, that is not a literal representation of future conditions. Vehicular volumes cannot exceed vehicular capacity, as a highway cannot transport more vehicles in an hour than it has capacity for.

Golden Gate Bridge

On the northbound lanes of the Golden Gate Bridge, the cumulative travel demand projected from the Downtown & Vicinity and from the rest of the region would exceed available capacity throughout the 4:00 to 6:00 p.m. period. Between 1985 and 2020, vehicular travel demand from the Downtown & Vicinity would grow by 22% with Alternative A, 15% with Alternative B, and 21% with Alternative N. The percentage of year 2020 vehicles crossing the Golden Gate Bridge whose journey begins in the Downtown & Vicinity would drop from 42% in 1985 to about 40% in 2020. That percentage would decrease to 38% in 2000, on the basis of the assumed shift by travelers from the Downtown & Vicinity to higher use of transit and ridesharing modes and lower use of vehicles. The percentage would increase between 2000 and 2020 because the forecasts of year 2020 highway travel demand (unlike the forecasts of year 2000 highway travel demand) are unconstrained by capacity, and do not incorporate additional modal shifts.

The northbound lanes of the Golden Gate Bridge, which are assumed not to change from the current four (reversible) lanes, would be operating at LOS E throughout at least the 4:00 to 6:00 p.m. period. The northbound lanes of the Golden Gate Bridge would operate at 30 mph or less (V/C = 1.0) for about 2.5 hours (although additional modal shifts, beyond those projected for year 2000 travel, would reduce this level of vehicular travel demand).

The p.m. peak congestion period on the northbound lanes of the Golden Gate Bridge would change as follows:

- In 1985, the peak congestion period (when demand equals capacity) lasted less than one hour, and capacity during the 4:00 to 6:00 p.m. period was available to accommodate about 1,600 additional vehicles.

- By 2000, the peak congestion period would last for about two hours, assuming that travelers from Downtown & Vicinity shift to transit and ridesharing modes, as needed to accommodate cumulative vehicular travel demand during the 4:00 to 6:00 p.m. period.
- By 2020, the peak congestion period would last for about 2.5 hours. The peak congestion period could be reduced to two hours, if the two-hour excess demand of 1,950 vehicles with Alternative A, 1,600 with Alternative B, or 1,900 with Alternative N could be accommodated on transit systems or HOV facilities expanded from those anticipated for the year 2000. Those numbers of vehicles exceeding capacity during the 4:00 to 6:00 p.m. period are projected to come from both the Downtown & Vicinity and other parts of the region, and assume no further changes in modal shares between 2000 and 2020.

As with operating conditions projected during the peak period, the demand projections indicate that during the p.m. peak hour, the northbound lanes of the Golden Gate Bridge would be operating at LOS F, with speeds dropping below 30 mph. That the peak-period demand projections are shown exceeding capacity available in two hours indicates the possible extension of congestion, if modal shifts during the peak period or shifts in the times of vehicular travel do not occur.

Unlike the year 2000, when shifts in travel mode would provide the most likely option for travelers from the Downtown & Vicinity constrained by highway capacity, that option would not be as feasible for year 2020 travelers. By 2020, projected cumulative travel demand across the Golden Gate screenline would require major transportation system capacity increases.

The "reasonably assured capacity" assumed in the 2000 analysis for Golden Gate buses would not be sufficient to serve the cumulative travel projected after modal shifts by travelers from the Downtown & Vicinity. By 2020, accommodating additional travelers from the Downtown & Vicinity shifting to peak-period transit services could require a second deck on the Golden Gate Bridge. The second deck could accommodate a dedicated system of bus-only or bus / HOV lanes and structures along the corridor, or a light rail transit line. (See p. VI.E.217 for a full discussion of possible mitigation measures identified for 2020.)

San Francisco – Oakland Bay Bridge

On the eastbound lanes of the Bay Bridge, the cumulative travel demand projected from the Downtown & Vicinity and from the rest of the region would use available capacity for over five afternoon hours in the year 2020. Growth in vehicular travel emanating from the Downtown & Vicinity during the p.m. peak period is projected between 2000 and 2020, unlike between 1985 and 2000./89/ As a result of that projection, the two-hour vehicular travel demand from the Downtown & Vicinity between 1985 and 2020 (between 2000 and 2020) would grow as follows: 13% with Alternative A, 9% with Alternative B, and 12% with Alternative N. Between 1985 and 2000, travelers from the Downtown & Vicinity are projected to shift to other modes during the p.m. two-hour peak period. That assumed shift to other modes, combined with projected growth in travel from outside the Downtown & Vicinity ("through" travel), is the reason why the percentage of p.m.-peak-period vehicles crossing the Bay Bridge from the Downtown & Vicinity is projected to decrease from about 46% in 1985 to about 45% in 2000, and to about 38% in 2020.

The eastbound lanes of the Bay Bridge in the year 2020 would be operating at capacity (LOS E) during about 5.5 hours of congestion. Operating conditions on the Bay Bridge would not change from those existing in 1985, but the p.m. peak congestion period would expand from about two hours in 1985. On the western (San Francisco) approach, the LOS would continue to be F and the duration of congestion would increase from about three hours to about six hours. For vehicles traveling eastbound, speeds on the western approach to the bridge would be approximately 15 to 20 mph, and on the span itself about 30 mph during the peak congestion period.

The p.m. peak congestion period on the eastbound lanes of the Bay Bridge would change as follows:

- In 1985, the peak congestion period (when demand equals capacity) lasted for almost two hours, and almost no capacity was available to accommodate additional vehicles during the 4:00 to 6:00 p.m. time period.
- By 2000, the p.m. peak congestion period would last for about 4.5 hours, assuming that travelers from the Downtown & Vicinity shift to transit and ridesharing modes as needed to accommodate cumulative vehicular travel demand between 4:00 and 6:00 p.m.
- By 2020, the peak congestion period would last for over five hours, if the 5,850 vehicles with Alternative A, 5,550 vehicles with Alternative B, and 5,800 vehicles with Alternative N that would exceed the bridge's two-hour capacity could not be accommodated on other bridges or other modes of travel. Those numbers of vehicles exceeding capacity during the 4:00 to 6:00 p.m. period are projected to come from both the Downtown & Vicinity and other parts of the region, and assume no further changes in modal shares between 2000 and 2020.

Shifts to other bridges and other travel times would provide the most likely options to accommodate some excess year 2000 vehicle demand. However, those options would not be feasible for year 2020 travelers. By 2020, projected cumulative travel demand across the San Francisco Bay screenline would require major transportation system capacity increases. Such improvements could involve increasing the number of lanes on the Bay Bridge or the Hayward – San Mateo Bridge; constructing a new transbay roadway crossing; or constructing a new transbay tube for increased public transit. (For a full discussion on possible measures to increase transbay travel capacity, see Mitigation, p. VI.E.226.)

U.S. 101 at the San Mateo County Line

On the southbound lanes of U.S. 101 at the South Bay Screenline, the cumulative travel demand projected from the Downtown & Vicinity and from the rest of the region would use available capacity for over three p.m. hours. Vehicular travel there from the rest of the region is forecast to grow 28% between 1985 and 2020, while vehicular travel from the Downtown & Vicinity is forecast to grow 65% with Alternative A, 51% with Alternative B, and 58% with Alternative N.

As a result of the cumulative growth in peak-period vehicular travel, the duration of congestion (V/C = 1.0) on U.S. 101 is projected to expand from less than one hour in 1985, to about 2.5 hours in 2000, and to over three hours in 2020. Total vehicular demand is projected to exceed U.S. 101's two-hour capacity in 2020 by about 4,400 vehicles under Alternative A, 3,625 vehicles under Alternative B, and 4,000 vehicles under Alternative N.

U.S. 101 at the San Mateo County line would operate at LOS E during the p.m. peak period, and LOS F during the p.m. peak hour. Operating speeds would be approximately 30 to 35 mph during the p.m. peak period, dropping below 30 mph during the p.m. peak hour.

By 2020, excess vehicular demand (beyond available capacity) is projected for U.S. 101 at the South Bay screenline beyond the 4:00 to 6:00 p.m. period. As anticipated for the year 2000, shifts to other travel times, to I-280 south of the U.S.-101/I-280 Interchange, and to transit would provide the most likely options to accommodate excess vehicle demand. By 2020, however, I-280 is not projected to be able to accommodate excess vehicle demand from U.S. 101 through the U.S.-101 / I-280 Interchange. Greater reliance on transit service improvements and extensions would be required to accommodate excess vehicle demand forecast for U.S. 101. Although BART, CalTrain and SamTrans would in combination have enough capacity to accommodate the potential shift to transit required to accommodate excess vehicular demand from the Downtown & Vicinity, the greatest increases in ridership would occur on the transit systems having the capacity to transport travelers directly to downtown San Francisco. Without the provision of bus / HOV lanes, SamTrans buses would not be able to provide travel times competitive with those of the congested freeways. Possible measures to increase travel capacity to the South Bay are an extension of CalTrain to downtown San Francisco; or southern extensions of MUNI Metro and BART. (Those measures are discussed in full in Mitigation, p. VI.E.230.)

I-280 at the San Mateo County Line

I-280 at the South Bay Screenline is projected to be operating below capacity during the p.m. peak period. However, that freeway is projected to be operating at capacity throughout the p.m. peak period at its interchange with U.S. 101. (U.S. 101 would also be operating at capacity throughout the p.m. peak period at the U.S.-101 / I-280 Interchange.)

During the p.m. peak period and hour, I-280 would be operating at LOS D-E (V/C = 0.90 and 0.89, respectively), and speeds of 35 to 40 mph would be expected. For southbound traffic, I-280's LOS at the San Mateo County line would be consistent throughout the two peak hours, because the capacity of the U.S.-101 / I-280 Interchange would meter vehicular travel demand to the County line. I-280's operating conditions would be statistically identical among Mission Bay Alternatives, as forecasts of volumes on I-280 are nearly identical among Alternatives.

Transit Systems

Small differences in cumulative transit ridership at screenlines are forecast among Mission Bay Alternatives, except for the South Bay screenline. This conclusion is derived from the p.m. peak-period and peak-hour travel forecasts for the year 2020 presented in Tables VI.E.16-VI.E.19, which show both changes in transit ridership from 1985 to 2020 and changes from 2000 to 2020. The forecasts of transit riders are related directly to the highway travel forecasts presented in Table VI.E.15, p. VI.E.108-VI.E.109 and the transit system capacities presented in Table VI.E.20, p. VI.E.130.

The increase in transit ridership from the Downtown & Vicinity would be greater between 1985 and 2000 than between 2000 and 2020, primarily as a result of the lower rate of employment growth projected for the Downtown & Vicinity between 2000 and 2020.

TABLE VI.E.16: P.M. PEAK PERIOD OUTBOUND TRANSIT RIDERS AT SCREENLINES: 1985 AND 2020

Screenline	Operator	1985/a/	2020					
			Alt. A	% Change from 1985/b/	Alt. B	% Change from 1985/b/	Alt. N	% Change from 1985/b/
Northeast	Muni							
	total volume	13,300	17,150	29	16,850	27	17,250	30
	volume from Project Area/c/	/d/	775	/e/	200	/e/	550	/e/
	volume from Downtown & Vicinity/f/	11,900	15,400	29	15,100	27	15,500	30
	volume from rest of region/g/	1,400	1,750	25	1,750	25	1,750	25
Northwest	Muni							
	total volume	13,600	16,850	24	16,600	22	17,050	25
	volume from Project Area/c/	/d/	800	/e/	200	/e/	575	/e/
	volume from Downtown & Vicinity	12,850	15,900	24	15,650	22	16,100	25
	volume from rest of region	750	950	27	950	27	950	27
Southwest	Muni							
	total volume	21,500	25,800	20	25,250	17	26,050	21
	volume from Project Area/c/	/d/	1,225	/e/	300	/e/	875	/e/
	volume from Downtown & Vicinity	20,500	24,500	20	23,950	17	24,750	21
	volume from rest of region	1,000	1,300	30	1,300	30	1,300	30
Southeast	Muni							
	total volume	5,600	6,900	23	6,750	21	7,000	25
	volume from Project Area/c/	/d/	325	/e/	75	/e/	225	/e/
	volume from Downtown & Vicinity	5,300	6,550	23	6,400	20	6,650	25
	volume from rest of region	300	350	26	350	26	350	26
North Bay	Golden Gate Bus							
	total volume	5,600	13,225	136	12,400	122	13,125	134
	volume from Project Area	/d/	625	/e/	150	/e/	450	/e/
	volume from Downtown & Vicinity	5,150	12,650	145	11,825	129	12,550	143
	volume from rest of region	450	575	24	575	24	575	24
North Bay	Golden Gate Ferry							
	total volume	1,200	2,400	100	2,250	88	2,350	96
	volume from Project Area/c/	/d/	100	/e/	25	/e/	75	/e/
	volume from Downtown & Vicinity	1,000	2,000	100	1,850	85	1,950	95
	volume from rest of region	200	400	100	400	100	400	100
East Bay	BART							
	total volume	24,900	57,500	131	55,750	124	57,200	130
	volume from Project Area/c/	/d/	2,750	/e/	675	/e/	1,875	/e/
	volume from Downtown & Vicinity	21,900	53,450	144	51,700	136	53,150	143
	volume from rest of region	3,000	4,050	35	4,050	35	4,050	35

(continued)

TABLE VI.E.16: P.M. PEAK PERIOD OUTBOUND TRANSIT RIDERS AT SCREENLINES: 1985 AND 2020 (continued)

			2020					
Screenline	Operator	1985/a/	Alt. A	% Change from 1985/b/	Alt. B	% Change from 1985/b/	Alt. N	% Change from 1985/b/
East Bay	AC Transit							
	total volume	11,600	21,375	84	20,700	78	21,275	83
	volume from Project Area/c/	/d/	1,025	/e/	250	/e/	725	/e/
	volume from Downtown & Vicinity	10,900	20,450	88	19,775	81	20,350	87
	volume from rest of region	700	925	35	925	35	925	35
South Bay	CalTrain							
	total volume	3,500	4,350	24	4,025	15	5,525	58
	volume from Project Area/c/	/d/	200	/e/	50	/e/	200	/e/
	volume from Downtown & Vicinity	3,400	4,200	24	3,875	14	5,375	58
	volume from rest of region	100	150	50	150	50	150	50
	SamTrans							
	total volume	2,000	3,300	65	3,075	54	3,000	50
	volume from Project Area/c/	/d/	150	/e/	50	/e/	100	/e/
	volume from Downtown & Vicinity	1,825	3,050	67	2,825	55	2,750	51
	volume from rest of region	175	250	43	250	43	250	43
South Bay (West Bay)/h/	BART							
	total volume	11,000	14,425	31	13,850	26	14,200	29
	volume from Project Area/c/	/d/	650	/e/	175	/e/	450	/e/
	volume from Downtown & Vicinity	9,900	13,025	31	12,450	26	12,800	29
	volume from rest of region	1,100	1,400	27	1,400	27	1,400	27

/a/ Volumes consistent with the data listed in Table VI.E.6, p. VI.E.35 were provided by individual transit operators for the 1984-1986 time period. Barton-Aschman Associates, Inc. created the estimates of 1985 volumes of riders traveling from the Project Area, Downtown & Vicinity or the rest of the region.

/b/ Rounding off volumes to the nearest 25 or 50 was done so as not to overstate the accuracy of the projections. The percent changes are based on the unrounded numbers.

/c/ Volumes from the Project Area describe those travelers who begin their trip at a land use, not a transit terminal, located within the Project Area.

/d/ Volumes closer to 0 than to 25 when rounded off are not shown.

/e/ These percentages cannot be calculated without overstating the accuracy of the projections.

/f/ Volumes from Downtown & Vicinity describe those travelers who begin their trip at a land use located within Downtown & Vicinity, including the Project Area.

/g/ Volumes from the rest of the region describe those travelers who begin their trip at a land use located in any area of San Francisco outside Downtown & Vicinity or in any county outside San Francisco.

/h/ The volumes shown would occur on westbound trains leaving Civic Center Station.

SOURCE: Barton-Aschman Associates, Inc.

TABLE VI.E.17: P.M. PEAK HOUR OUTBOUND TRANSIT RIDERS AT SCREENLINES: 1985 AND 2020

			2020					
Screenline	Operator	1985/a/	Alt. A	% Change from 1985/b/	Alt. B	% Change from 1985/b/	Alt. N	% Change from 1985/b/
Northeast	Muni							
	total volume	7,400	9,525	29	9,350	26	9,575	29
	volume from Project Area/c/	/d/	450	/e/	125	/e/	325	/e/
	volume from Downtown & Vicinity/f/	7,075	9,100	29	8,925	26	9,150	29
	volume from rest of region/g/	325	425	27	425	27	425	27
Northwest	Muni							
	total volume	8,700	10,750	24	10,575	22	10,850	25
	volume from Project Area/c/	/d/	500	/e/	125	/e/	350	/e/
	volume from Downtown & Vicinity	7,950	9,825	24	9,650	21	9,925	25
	volume from rest of region	750	925	26	925	26	925	26
Southwest	Muni							
	total volume	12,250	14,700	20	14,375	17	14,825	21
	volume from Project Area/c/	/d/	700	/e/	175	/e/	500	/e/
	volume from Downtown & Vicinity	11,750	14,050	20	13,725	17	14,175	21
	volume from rest of region	500	650	26	650	26	650	26
Southeast	Muni							
	total volume	3,250	4,000	23	3,925	21	4,050	25
	volume from Project Area/c/	/d/	175	/e/	50	/e/	125	/e/
	volume from Downtown & Vicinity	3,000	3,700	23	3,625	21	3,750	25
	volume from rest of region	250	300	26	300	26	300	26
North Bay	Golden Gate Bus							
	total volume	3,800	8,975	136	8,425	122	8,900	134
	volume from Project Area/c/	/d/	425	/e/	100	/e/	300	/e/
	volume from Downtown & Vicinity	3,450	8,525	147	7,975	131	8,450	145
	volume from rest of region	350	450	26	450	26	450	26
	Golden Gate Ferry							
	total volume	900	1,700	89	1,625	81	1,700	89
	volume from Project Area/c/	/d/	75	/e/	25	/e/	50	/e/
	volume from Downtown & Vicinity	750	1,450	93	1,375	83	1,450	93
	volume from rest of region	150	250	67	250	67	250	67
East Bay	BART							
	total volume	14,200	33,500	136	32,500	129	33,400	135
	volume from Project Area/c/	/d/	1,600	/e/	400	/e/	1,125	/e/
	volume from Downtown & Vicinity	13,100	32,000	144	31,000	137	31,900	144
	volume from rest of region	1,100	1,500	35	1,500	35	1,500	35

(continued)

TABLE VI.E.17: P.M. PEAK HOUR OUTBOUND TRANSIT RIDERS AT SCREENLINES: 1985 AND 2020 (continued)

Screenline	Operator	1985/a/	2020 Alt. A	% Change from 1985/b/	Alt. B	% Change from 1985/b/	Alt. N	% Change from 1985/b/
East Bay	AC Transit							
	total volume	7,800	14,400	85	13,950	79	14,350	84
	volume from Project Area/c/	/d/	700	/e/	175	/e/	475	/e/
	volume from Downtown & Vicinity	7,400	13,850	87	13,400	81	13,800	86
	volume from rest of region	400	550	38	550	38	550	38
South Bay	CalTrain							
	total volume	2,300	2,850	24	2,650	15	3,625	58
	volume from Project Area/c/	/d/	150	/e/	25	/e/	125	/e/
	volume from Downtown & Vicinity	2,225	2,750	24	2,550	15	3,525	58
	volume from rest of region	75	100	33	100	33	100	33
	SamTrans							
	total volume	1,600	2,700	69	2,525	58	2,700	69
	volume from Project Area/c/	/d/	125	/e/	25	/e/	100	/e/
	volume from Downtown & Vicinity	1,475	2,550	73	2,375	61	2,550	73
	volume from rest of region	125	150	20	150	20	150	20
South Bay (West Bay)/h/	BART							
	total volume	6,500	8,525	31	8,250	27	8,575	32
	volume from Project Area/c/	/d/	400	/e/	100	/e/	275	/e/
	volume from Downtown & Vicinity	5,925	7,800	32	7,525	27	7,850	32
	volume from rest of region	575	725	26	725	26	725	26

/a/ Volumes consistent with the data listed in Table VI.E.6, p. VI.E.35 were provided by individual transit operators for the 1984-1986 time period. Barton-Aschman Associates, Inc. created the estimates of 1985 volumes of riders traveling from the Project Area, Downtown & Vicinity or from the rest of the region.

/b/ Rounding off volumes to the nearest 25 or 50 was done so as not to overstate the accuracy of the projections. The percent changes are based on the unrounded numbers.

/c/ Volumes from the Project Area describe those travelers who begin their trip at a land use, not a transit terminal, located within the Project Area.

/d/ Volumes closer to 0 than to 25 when rounded off are not shown.

/e/ These percentages cannot be calculated without overstating the accuracy of the projections.

/f/ Volumes from Downtown & Vicinity describe those travelers who begin their trip at a land use located within Downtown & Vicinity, including the Project Area.

/g/ Volumes from the rest of the region describe those travelers who begin their trip at a land use located in any area of San Francisco outside Downtown & Vicinity or in any county outside San Francisco.

/h/ The volumes shown would occur on westbound trains leaving Civic Center Station.

SOURCE: Barton-Aschman Associates, Inc.

TABLE VI.E.18: P.M. PEAK PERIOD OUTBOUND TRANSIT RIDERS AT SCREENLINES, 2000 AND 2020

Screenline	Operator	Alternative A		% Change from 2000/a/	Alternative B		% Change from 2000/a/	Alternative N		% Change from 2000/a/
		2000	2020		2000	2020		2000	2020	
Northeast	Muni									
	total volume	15,600	17,150	10	15,550	16,850	8	15,650	17,200	10
	volume from Project Area/b/	300	775	158	175	200	14	225	550	144
	volume from Downtown & Vicinity/c/	14,000	15,400	10	13,950	15,100	8	14,050	15,500	10
	volume from rest of region/d/	1,600	1,750	9	1,600	1,750	9	1,600	1,750	9
Northwest	Muni									
	total volume	15,400	16,850	9	15,350	16,600	8	15,500	17,050	10
	volume from Project Area/b/	325	800	146	175	200	14	250	575	130
	volume from Downtown & Vicinity	14,550	15,900	9	14,500	15,700	8	14,650	16,100	10
	volume from rest of region	850	950	12	850	950	12	850	950	12
Southwest	Muni									
	total volume	23,750	25,800	9	23,500	25,250	7	23,700	26,050	10
	volume from Project Area/b/	500	1,225	145	275	300	9	375	875	133
	volume from Downtown & Vicinity	22,600	24,500	8	22,350	23,950	7	22,550	24,750	10
	volume from rest of region	1,150	1,300	13	1,150	1,300	13	1,150	1,300	13
Southeast	Muni									
	total volume	6,350	6,900	9	6,250	6,750	8	6,300	7,000	11
	volume from Project Area/b/	150	325	117	75	75	10	100	225	125
	volume from Downtown & Vicinity	6,000	6,550	9	5,900	6,400	8	5,950	6,650	12
	volume from rest of region	350	350	10	350	350	10	350	350	10
North Bay	Golden Gate Bus									
	total volume	11,000	13,225	13	10,900	12,400	14	10,900	13,125	20
	volume from Project Area/b/	225	625	178	125	150	20	175	450	157
	volume from Downtown & Vicinity	10,500	12,650	20	10,400	11,825	14	10,400	12,550	21
	volume from rest of region	500	575	15	500	575	15	500	575	15
	Golden Gate Ferry									
	total volume	1,900	2,400	26	1,875	2,250	20	1,900	2,350	24
	volume from Project Area/b/	50	100	100	25	25	10	25	75	200
	volume from Downtown & Vicinity	1,650	2,000	21	1,625	1,850	14	1,650	1,950	18
	volume from rest of region	250	400	60	250	400	60	250	400	60
East Bay	BART									
	total volume	50,550	57,500	14	50,100	55,750	11	50,300	57,200	14
	volume from Project Area/b/	1,050	2,750	162	600	675	12	750	1,875	150
	volume from Downtown & Vicinity	47,100	53,450	13	46,650	51,700	11	46,850	53,150	13
	volume from rest of region	3,450	4,050	17	3,450	4,050	17	3,450	4,050	17
	AC Transit									
	total volume	18,800	21,375	14	18,650	20,700	11	18,700	21,275	14
	volume from Project Area/b/	400	1,025	156	225	250	11	275	725	164
	volume from Downtown & Vicinity	18,000	20,450	14	17,850	19,775	11	17,900	20,350	14
	volume from rest of region	800	925	16	800	925	16	800	925	16

(continued)

TABLE VI.E.18: P.M. PEAK PERIOD OUTBOUND TRANSIT RIDERS AT SCREENLINES, 2000 AND 2020 (continued)

Screenline	Operator	Alternative A 2000	Alternative A 2020	% Change from 2000/a/	Alternative B 2000	Alternative B 2020	% Change from 2000/a/	Alternative N 2000	Alternative N 2020	% Change from 2000/a/
South Bay	CalTrain									
	total volume	3,650	4,350	19	3,600	4,025	12	4,600	5,525	20
	volume from Project Area/b/	75	200	167	50	50	10	75	200	167
	volume from Downtown & Vicinity/c/	3,525	4,200	19	3,475	3,875	12	4,475	5,375	20
	volume from rest of region/d/	125	150	20	125	150	20	125	150	20
	SamTrans									
	total volume	2,850	3,300	16	2,800	3,075	10	2,600	3,000	15
	volume from Project Area/b/	50	150	200	25	50	100	50	100	100
	volume from Downtown & Vicinity	2,650	3,050	15	2,600	2,825	9	2,400	2,750	15
	volume from rest of region	200	250	25	200	250	25	200	250	25
South Bay (West Bay)/e/	BART									
	total volume	12,900	14,425	12	12,800	13,850	8	12,600	14,200	13
	volume from Project Area/b/	250	650	160	150	175	17	175	450	157
	volume from Downtown & Vicinity	11,650	13,025	12	11,550	12,450	8	11,350	12,800	13
	volume from rest of region	1,250	1,400	12	1,250	1,400	12	1,250	1,400	12

/a/ Rounding off volumes to the nearest 25 or 50 was done so as not to overstate the accuracy of the projections. The percent changes are based on the unrounded numbers.

/b/ Volumes from the Project Area describe those travelers who begin their trip at a land use, not a transit terminal, located within the Project Area.

/c/ Volumes from Downtown & Vicinity describe those travelers who begin their trip at a land use located within Downtown & Vicinity, including Project Area.

/d/ Volumes from the rest of the region describe those travelers who begin their trip at a land use located in any area of San Francisco outside Downtown & Vicinity or in any county outside San Francisco.

/e/ The volumes shown would occur on westbound trains leaving Civic Center Station.

SOURCE: Barton-Aschman Associates, Inc.

TABLE VI.E.19: P.M. PEAK HOUR OUTBOUND TRANSIT RIDERS AT SCREENLINES, 2000 AND 2020

Screenline	Operator	Alternative A 2000	Alternative A 2020	% Change from 2000/a/	Alternative B 2000	Alternative B 2020	% Change from 2000/a/	Alternative N 2000	Alternative N 2020	% Change from 2000/a/
Northeast	Muni									
	total volume	8,675	9,525	10	8,650	9,350	8	8,700	9,575	10
	volume from Project Area/b/	200	450	125	100	125	25	150	325	117
	volume from Downtown & Vicinity/c/	8,300	9,100	10	8,275	8,925	8	8,325	9,150	10
	volume from rest of region/d/	375	425	13	375	425	13	375	425	13
Northwest	Muni									
	total volume	9,800	10,750	10	9,800	10,575	8	9,875	10,850	10
	volume from Project Area/b/	200	500	150	125	200	60	150	350	133
	volume from Downtown & Vicinity	8,950	9,825	10	8,950	9,650	8	9,025	9,925	10
	volume from rest of region	850	925	9	850	925	9	850	925	9
Southwest	Muni									
	total volume	13,500	14,700	9	13,400	14,375	7	13,500	14,825	10
	volume from Project Area/b/	275	700	155	150	175	17	225	500	122
	volume from Downtown & Vicinity	12,900	14,050	9	12,800	13,725	7	12,900	14,175	10
	volume from rest of region	600	650	8	600	650	8	600	650	8
Southeast	Muni									
	total volume	3,675	4,000	9	3,625	3,925	8	3,650	4,050	11
	volume from Project Area/b/	75	175	133	50	100	100	50	150	200
	volume from Downtown & Vicinity	3,400	3,700	9	3,350	3,625	8	3,375	3,750	11
	volume from rest of region	275	300	9	275	300	9	275	300	9
North Bay	Golden Gate Bus									
	total volume	7,450	8,975	20	7,400	8,425	14	7,400	8,900	20
	volume from Project Area/b/	150	425	183	100	150	50	125	300	140
	volume from Downtown & Vicinity	7,050	8,525	21	7,000	7,975	14	7,000	8,450	21
	volume from rest of region	400	450	12	400	450	12	400	450	12
	Golden Gate Ferry									
	total volume	1,425	1,700	19	1,400	1,625	16	1,400	1,700	21
	volume from Project Area/b/	25	75	200	25	50	100	25	50	100
	volume from Downtown & Vicinity	1,225	1,450	18	1,200	1,375	15	1,200	1,450	21
	volume from rest of region	200	250	25	200	250	25	200	250	25
East Bay	BART									
	total volume	29,350	33,500	14	29,225	32,500	11	29,500	33,400	13
	volume from Project Area/b/	625	1,600	156	350	400	14	450	1,125	150
	volume from Downtown & Vicinity	28,075	32,000	14	27,950	31,000	11	28,225	31,900	13
	volume from rest of region	1,275	1,500	18	1,275	1,500	18	1,275	1,500	18
	AC Transit									
	total volume	12,625	14,400	14	12,575	13,950	11	12,700	14,350	13
	volume from Project Area/b/	275	700	155	150	175	17	200	475	137
	volume from Downtown & Vicinity	12,150	13,850	14	12,100	13,400	11	12,225	13,800	13
	volume from rest of region	475	550	16	475	550	16	475	550	16

(continued)

TABLE VI.E.19: P.M. PEAK HOUR OUTBOUND TRANSIT RIDERS AT SCREENLINES, 2000 AND 2020 (continued)

Screenline	Operator	Alternative A 2000	Alternative A 2020	% Change from 2000/a/	Alternative B 2000	Alternative B 2020	% Change from 2000/a/	Alternative N 2000	Alternative N 2020	% Change from 2000/a/
South Bay	CalTrain									
	total volume	2,400	2,850	19	2,400	2,650	10	3,050	3,625	19
	volume from Project Area/b/	50	150	200	25	60	140	50	125	150
	volume from Downtown & Vicinity	2,300	2,750	20	2,300	2,550	11	2,950	3,525	19
	volume from rest of region	100	100	0	100	100	0	100	100	0
	SamTrans									
	total volume	2,425	2,700	11	2,400	2,525	5	2,100	2,700	29
	volume from Project Area/b/	50	125	150	50	50	0	25	100	200
	volume from Downtown & Vicinity	2,275	2,550	12	2,250	2,375	6	1,950	2,550	31
	volume from rest of region	150	150	0	150	150	0	150	150	0
South Bay (West Bay)/e/	BART									
	total volume	7,850	8,525	9	7,775	8,250	6	7,450	8,575	15
	volume from Project Area/b/	150	400	167	100	120	20	100	275	175
	volume from Downtown & Vicinity	7,200	7,800	8	7,125	7,525	6	6,800	7,850	15
	volume from rest of region	650	725	12	650	725	12	650	725	12

/a/ Rounding off volumes to the nearest 25 or 50 was done so as not to overstate the accuracy of the projections. The percent changes are based on the unrounded numbers.

/b/ Volumes from the Project Area describe those travelers who begin their trip at a land use, not a transit terminal, located within the Project Area.

/c/ Volumes from Downtown & Vicinity describe those travelers who begin their trip at a land use located within Downtown & Vicinity, including Project Area.

/d/ Volumes from the rest of the region describe those travelers who begin their trip at a land use located in any area of San Francisco outside Downtown & Vicinity or in any county outside San Francisco.

/e/ The volumes shown would occur on westbound trains leaving Civic Center Station

SOURCE: Barton-Aschman Associates, Inc.

Those differences in the rates of employment growth, which would generate growth in commute travel, are projected across all screenlines. For the North Bay and East Bay screenlines, the increase in transit ridership between 1985 and 2000 would also be attributed to modal shifts to transit. Additional modal shifts have not been projected for any screenline for 2020, in order to define the additional capacity required by 2020 beyond the "reasonably assured" capacity projected for 2000.

MUNI Screenlines Within San Francisco

Ridership on MUNI from the Downtown & Vicinity during the p.m. peak period is forecast to increase between 1985 and 2020 by the following percentages: approximately 27% to 30% across the Northeast screenline, 22% to 25% across the Northwest screenline, 17% to 21% across the Southwest screenline, and 20% to 25% across the Southeast screenline. Between 2000 and 2020, ridership on MUNI from the Downtown & Vicinity is forecast to increase by the following percentages: approximately 8% to 10% across the Northeast screenline, 8% to 10% across the Northwest screenline, 7% to 10% across the Southwest screenline, and 8% to 12% across the Southeast screenline.

By 2020, the Project Area Alternatives would statistically affect cumulative travel demand across the MUNI screenlines. Differences among Alternatives in the numbers of peak period year 2020 transit riders across MUNI screenlines would range from about 3.7% for the Southeast screenline, to 3.2% for the Southwest screenline, to 2.7% for the Northwest screenline, down to 2.1% for the Northeast screenline. The highest outbound volumes of MUNI riders would occur with Alternative N, and the lowest with Alternative B. Alternative N would provide the greatest increase in employment relative to housing (and employed residents) within the Project Area (and the Downtown & Vicinity), and Alternative B the greatest increase in housing relative to employment. Alternative A would provide the greatest increase in employment in the Downtown & Vicinity, but would also provide much more housing than Alternative N, and less than Alternative B.

In 2020, the Project Area would account for the following approximate percentages of total MUNI p.m. peak period ridership across each screenline: 4.7% with Alternative A, 1.2% with Alternative B, and 3.4% with Alternative N. Those percentages are based primarily on the assumption that travelers from the Project Area would ride MUNI at the same rate as would travelers from the Downtown & Vicinity.

The greatest numbers of outbound riders on MUNI routes crossing each screenline would continue to come from Downtown & Vicinity, as indicated by the following percentages of total peak-period riders forecast to begin their journey from a land use in the Downtown & Vicinity: approximately 90% of riders across the Northeast screenline, 94% across the Northwest screenline, 95% across the Southwest screenline, and 95% across the Southeast screenline. Increases in MUNI's ridership from 1985 to 2020 would lag behind growth in employment in the Downtown & Vicinity, because smaller percentages of the people working in the Downtown & Vicinity would reside in San Francisco in 2020 than in 1985 (see Appendix C. Housing and Population, Table XIV.C.12, p. XIV.C.27).

Golden Gate Transit - Buses

Ridership on Golden Gate buses during the p.m. peak period is forecast to increase much more rapidly between 1985 and 2000 than between 2000 and 2020. In those two time intervals, Golden Gate bus ridership would increase as follows: with Alternative A--136% between 1985 and 2020 and 20% between 2000 and 2020; with Alternative B--122% between 1985 and 2020 and 14% between 2000 and 2020; and with Alternative N--134% between 1985 and 2020 and 20% between 2000 and 2020. Those very large increases in ridership are forecast as a result of a combination of factors affecting total travel demand across the Golden Gate screenline:

- Growth between 1985 and 2020 in employment in the Downtown & Vicinity of about 47% with Alternative A, 43% with Alternative B, and 46% with Alternative N; plus
- Increase between 1985 and 2020 in the share of employees of the Downtown & Vicinity residing in the North Bay of about 12% with Alternative B and 16% with Alternatives A and N; plus
- A projected modal shift between 1985 and 2000 of about 41% in peak-period bus usage by travelers from the Downtown & Vicinity, associated with a 32% decrease in vehicle usage. This change is assumed to affect all Alternatives by 2000 because of the lack of p.m. peak-period vehicular capacity forecast for the Golden Gate Bridge by 2000 (see Table VI.E.7, p. VI.E.77). No additional modal shifts are incorporated in the 2020 projections; plus
- Growth between 1985 and 2020 of about 24% in ridership from outside the Downtown & Vicinity.

The percent of p.m. peak-period riders on Golden Gate buses whose journeys begin in the Downtown & Vicinity would increase from about 92% in 1985 to about 95% in 2020, as growth in Golden Gate bus ridership from the Downtown & Vicinity is forecast to outpace growth in ridership from other areas. Total Golden Gate bus ridership would be lowest with Alternative B, about 6.5% higher than that with Alternative A, and about 5.6% higher with Alternative N.

Golden Gate Transit - Ferries

Ridership on Golden Gate ferries during the p.m. peak period, as with Golden Gate buses, is forecast to increase much more rapidly between 1985 and 2000 than between 2000 and 2020, because the 2020 transit demand forecasts are not affected by modal shifts as are the 2000 forecasts. In those two time periods, Golden Gate ferry ridership would increase as follows: with Alternative A--100% between 1985 and 2000 and 26% between 2000 and 2020; with Alternative B--88% between 1985 and 2000 and 20% between 2000 and 2020; and with Alternative N--96% between 1985 and 2000 and 24% between 2000 and 2020. (Ridership on the Red and White Fleet ferries to Tiburon, which would be lower than on Golden Gate ferries, would also increase by smaller amounts, as statistically significant modal shifts are not anticipated for the Red and White Fleet ferries.)

Ridership on Golden Gate ferries would not grow as rapidly as ridership on Golden Gate buses, as larger areas of Marin and Sonoma are served more directly by more frequent bus routes, and total travel times on buses would be shorter from the Downtown & Vicinity to more places in Marin and Sonoma Counties than would journeys involving traveling to a ferry terminal and riding a ferry. Notwithstanding those differences between bus and ferry services, ridership on Golden Gate ferries would increase as a result of the projected increase in peak-period travel both from Downtown & Vicinity and elsewhere in San Francisco, and the projected vehicular demand-to-capacity constraints on the Golden Gate Bridge.

The Project Area would account for a relatively small proportion of total ridership on Golden Gate Transit buses and ferries. During the year 2020 p.m. peak period, the Project Area would account for about the following percentages of transit ridership across the Golden Gate screenline: with Alternative A--4.7% for buses and 4.2% for ferries; with Alternative B--1.2% for buses and 1.0% for ferries; and with Alternative N--3.4% for buses and 2.9% for ferries. Those percentages are based on the assumption that travelers from the Project Area would ride Golden Gate buses and ferries at the same rate as would travelers from all of the Downtown & Vicinity. The percentages for ferries are lower than for buses because a larger proportion of ferry riders would come from areas outside the Downtown & Vicinity.

BART - TransBay

Ridership on BART across the East Bay screenline during the p.m. peak period is also forecast to grow much more rapidly between 1985 and 2000 than between 2000 and 2020. In those two time periods, BART's ridership would increase as follows: with Alternative A--131% between 1985 and 2020 and 14% between 2000 and 2020; with Alternative B--124% between 1985 and 2020 and 11% between 2000 and 2020; and with Alternative N--130% between 1985 and 2020 and 14% between 2000 and 2020. This very large growth in BART's ridership is forecast as a result of a combination of factors affecting total travel demand across the East Bay screenline:

- Growth between 1985 and 2020 in employment in the Downtown & Vicinity of about 47% with Alternative A, 43% with Alternative B, and 46% with Alternative N; plus
- Increase between 1985 and 2020 of about 27% to 28% in the percentage of employees of the Downtown & Vicinity residing in the East Bay; plus
- A projected modal shift by 2000 of about 26% in BART usage by travelers from Downtown & Vicinity, associated with a 37% decrease in vehicle usage. (This change is assumed because, by 2000, the Bay Bridge would not be able to accommodate increases in vehicles from the Downtown & Vicinity during the p.m. peak period.) No additional modal shifts are incorporated in the 2020 projections; plus
- Growth between 1985 and 2020 of about 35% in ridership from outside the Downtown & Vicinity.

As travelers from the Downtown & Vicinity would have a higher propensity to shift to BART (due to easier access) than would travelers from other areas crossing the East Bay screenline, the increases in total BART ridership presented above would be attributed almost entirely to increases in travelers from the Downtown & Vicinity. During the p.m. peak period, BART ridership attributed to travelers from the Downtown & Vicinity is forecast to increase by 136% with Alternative B, 143% with Alternative N and 144% with Alternative A between 1985 and 2020.

AC Transit

Total ridership on AC Transit is projected to increase far less than on BART because of the assumed limitation on increasing AC Transit's TransBay services (either routes or frequencies). AC Transit's ridership increases between 1985 and 2020 would accommodate only growth in employment in the Downtown & Vicinity and in the share of employees of the Downtown & Vicinity residing in the East Bay. AC Transit's ridership during the peak period is forecast to increase between 1985 and 2020 by 84% with Alternative A, 78% with Alternative B, and 83% with Alternative N. Similarly to the other transit systems already described, AC Transit's ridership is forecast to increase far more between 1985 and 2000 than between 2000 and 2020, because more growth in employment in the Downtown & Vicinity is projected for the earlier period and because some shifts to AC Transit are forecast for 2000 but not for 2020. Between 2000 and 2020, AC Transit's ridership during the p.m. peak period and p.m. peak hour is forecast to grow as follows: 14% with Alternatives A and N, and 11% with Alternative B.

CalTrain, BART (South Bay) and SamTrans

As first described for the year 2000 forecasts, the South Bay screenline is the only regional screenline where the land use and transportation features of the Mission Bay Alternatives would directly affect the relative travel times among travel modes crossing the screenline. Those differences are explained on p. VI.E.84. For the purpose of this analysis, which is to identify the increases in capacity that would be required to serve the growth in travel forecast for each mode between 2000 and 2020, the Peninsula has been assumed to be served in 2020 by the same transit systems as in 1985 and assumed for 2000.

The travel forecasts prepared during the course of the CalTrain Station Locations (Study) are used in this EIR analysis to forecast that CalTrain ridership would be 22% lower with Alternatives A and B than with Alternative N, as a result of the changes in accessibility and relative travel times among competing modes that would accompany relocation of the CalTrain terminal. Consistent with the travel forecasts for 2000, approximately half of the ridership lost by CalTrain in 2020 would be reflected in increased vehicle trips and the remainder in increased use of BART and SamTrans.

For this analysis, ridership levels on CalTrain, BART (to the West Bay) and SamTrans are forecast to increase with all Alternatives solely as a result of growth in travel from the Downtown & Vicinity, and not because of shifts from vehicular travel. Changes in BART, CalTrain and SamTrans ridership projected to occur between 1985 and 2020 reflect not only the projected ridership impacts associated with the CalTrain Station relocation in Alternatives A and B, but also the effects on travel demand associated with each Alternative's mix of housing and employment. Between 1985 and 2020, ridership throughout the p.m. peak period on CalTrain is forecast to increase by about 24% with Alternative A, 15% with Alternative B, and 58% with Alternative N. Ridership during the p.m. peak period on SamTrans would increase between 1985 and 2020 by about 74% with

Alternative A, 62% with Alternative B, and 58% with Alternative N. P.m. peak period ridership on BART trains crossing the San Mateo County line is forecast to increase between 1985 and 2020 by about 46% with Alternative B and by 59% with Alternatives A and N. Those increases cannot be identified directly from the forecasts included in Tables VI.E.16 and VI.E.17, pp. VI.E.115-VI.E.118, which are for westbound BART trains at Civic Center Station. Those trains would transport persons to southeast and southwest San Francisco, as well as across the South Bay screenline.

Ridership across the South Bay screenline on all three transit systems is forecast to increase far more between 1985 and 2000 than between 2000 and 2020, because of the different employment increases forecast for the Downtown & Vicinity during the two time intervals. With Alternative N, ridership on all three systems would increase by about 15% to 20% between 2000 and 2020, compared with about 50% to 60% between 1985 and 2020. With Alternative N, ridership increases would reflect 1) anticipated growth in employment in the Downtown & Vicinity, and 2) small changes in the shares of employees of the Downtown & Vicinity expected to reside in the South Bay.

With Alternatives A and B, however, ridership forecasts for the two time intervals would also reflect the reduction in CalTrain's share of travel and the increase in BART's and SamTrans' share of travel projected to occur by 2000 as a result of the CalTrain terminal relocation. That is why CalTrain's ridership is forecast to increase by four percent with Alternative A and three percent with Alternative B between 1985 and 2000, but by 24% and 15%, respectively, between 1985 and 2020. Conversely, the large majority of the increases in SamTrans and BART ridership between 1985 and 2020 with Alternatives A and B are forecast to occur between 1985 and 2000.

Changes in ridership forecast for CalTrain, SamTrans and BART would be the result of a combination of factors affecting total travel demand across the South Bay screenline:

- Growth between 1985 and 2020 in employment in the Downtown & Vicinity of about 47% with Alternative A, 43% with Alternative B, and 46% with Alternative N; plus
- Increase between 1985 and 2020 of about 8% with Alternative A, 2% with Alternative B, and 9% with Alternative N in the share of employees of the Downtown & Vicinity residing in the South Bay; plus
- A projected reduction of about 22% in CalTrain ridership from that forecast for Alternative N for Alternatives A and B, associated with the relocation of the CalTrain terminal and the corresponding reallocation of travelers to vehicles, BART and SamTrans; plus

- Growth in ridership from outside the Downtown & Vicinity, ranging from 20% to 33%, depending on transit mode.

The primary component of ridership on BART, CalTrain, and SamTrans would continue to be ridership emanating from the Downtown & Vicinity, which would account for the following percentages of total ridership at the South Bay screenline: 96% of CalTrain riders, 93% of SamTrans riders, and 90% of BART riders.

Levels of Transit Service

Quality of transit service would change between 1985 and 2000 and between 2000 and 2020 as a result of changes in transit travel demand in relation to changes in transit travel capacity, which is uniformly measured by the number of seats provided. With capacity assumed not to increase between 2000 and 2020, the following changes in level of transit service are projected, and are presented in Table VI.E.20:

- Generally, LOS E would occur on MUNI trolley coaches, buses, streetcars and MUNI Metro trains crossing screenlines within San Francisco during the peak hour and period, except for the Southwest screenline, which would remain at D. Between 2000 and 2020, the LOS would degrade from D to E, except for the Northeast screenline during the peak-period and the Northwest screenline during the peak hour, both of which would be at E by 2000.

- Across the Golden Gate screenline, the LOS on buses would degrade from B in 1985 to D during the peak hour and C during the peak period in 2000, and to D in 2020 during the peak hour and peak period. The LOS on Golden Gate ferries would degrade from B in 1985 and 2000 to C in 2020 during the peak hour, remaining at B in the 2020 peak period.

- Across the East Bay screenline, the LOS would degrade for both BART and AC Transit during the peak period and hour. On AC Transit, the LOS would degrade from C in 1985 to E by 2000 (and 2020), while BART's LOS would degrade from E to F by 2000 (and 2020).

- Across the South Bay screenline, the LOS would remain about the same as in 1985, with projected improvements in the LOS as a result of anticipated increases in capacity. CalTrain and SamTrans would continue to operate at LOS B throughout the peak period for all Alternatives, except that CalTrain's LOS would degrade to C with Alternative N, due to the higher levels of ridership forecast with the Fourth and Townsend Street Station location. During the peak hour, SamTrans' LOS would improve from C in 1985 to B in 2020 for all Alternatives. BART's LOS would degrade from B in 2000 with Alternative N during the peak hour and with all Alternatives during the peak period, to C in 2020 with all Alternatives throughout the peak period. As BART's West Bay capacity is very sensitive to BART's plan for recycling TransBay trains, this is not a significant impact. (BART could operate more South Bay trains than assumed for this analysis by not taking as many peak-period trains out of service in BART's East Bay yards.)

TABLE VI.E.20: CUMULATIVE OUTBOUND TRANSIT DEMAND AND CAPACITY AT SCREENLINES: 2020/a/

			Alternative A			Alternative N			Alternative N		
Screenline	Transit Operator	Capacity/b/	Demand	D/C/c/	LOS/d/	Demand	D/C	LOS	Demand	D/C	LOS
PM Peak Hour											
Northeast	Muni	7,000	9,525	1.36	E	9,350	1.34	E	9,575	1.37	E
Northwest	Muni	7,700	10,750	1.40	E	10,575	1.37	E	10,850	1.41	E
Southwest	Muni	13,200	14,700	1.11	D	14,375	1.09	D	14,825	1.12	D
Southeast	Muni	3,050	4,000	1.31	E	3,925	1.29	E	4,050	1.33	E
North Bay	Golden Gate										
	Bus	7,200	8,975	1.25	D	8,425	1.17	D	8,900	1.24	D
	Ferry	1,900	1,700	0.89	C	1,625	0.86	C	1,700	0.89	C
East Bay											
	AC Transit	9,700	14,400	1.48	E	13,950	1.44	E	14,350	1.48	E
	BART	18,000	33,500	1.86	F	32,500	1.81	F	33,400	1.86	F
South Bay											
	BART/e/	9,000	8,525	0.95	C	8,250	0.92	C	8,575	0.95	C
	CalTrain	4,600	2,850	0.62	B	2,650	0.58	B	3,625	0.79	C
	SamTrans	3,700	2,700	0.73	B	2,525	0.68	B	2,700	0.73	B
PM Peak Period											
Northeast	Muni	12,100	17,150	1.42	E	16,850	1.39	E	17,200	1.42	E
Northwest	Muni	13,300	16,850	1.27	E	16,600	1.25	D	17,050	1.28	E
Southwest	Muni	22,700	25,800	1.13	D	25,850	1.14	D	26,050	1.15	D
Southeast	Muni	5,200	6,900	1.33	E	6,750	1.30	E	7,000	1.35	E
North Bay	Golden Gate										
	Bus	11,100	13,225	1.19	D	12,400	1.12	D	13,125	1.18	D
	Ferry	3,200	2,400	0.75	B	2,250	0.70	B	2,350	0.73	B
East Bay											
	AC Transit	14,700	21,375	1.45	E	20,700	1.41	E	21,275	1.45	E
	BART	30,900	57,500	1.86	F	55,750	1.80	F	57,200	1.85	F
South Bay											
	BART/e/	18,000	14,425	0.80	C	13,850	0.77	C	14,200	0.79	C
	CalTrain	6,900	4,350	0.63	B	4,025	0.58	B	5,525	0.80	C
	SamTrans	5,100	3,300	0.65	B	3,075	0.60	B	3,100	0.61	B

/a/ The Mission Bay Project Area would account for very small percentages of cumulative travel demand, as presented on pp. VI.E.114 et seq.

/b/ For consistency of this analysis, the unit of seats has been used to define capacity (see pp. VI.E.103–VI.E.104 for more discussion). Capacities are the same as projected for 2000.

/c/ Demand to capacity ratio (D/C) equals passengers per seat provided.

/d/ Level of Service, as defined in Transportation Research Board Circular 212.

/e/ Includes travelers to southeast and southwest San Francisco and to San Mateo County, measured as westbound departures at Civic Center Station.

SOURCE: Barton-Aschman Associates, Inc., based on projections of capacity supplied by the transit operators for use in the Mission Bay and South of Market EIRs. The letters are on file at the San Francisco Department of City Planning.

LOS projected for the year 2020 would require additional capacity in order that load policies not be exceeded for MUNI (across all but the Southwest screenline), Golden Gate buses, AC Transit buses, and BART (to the East Bay). Alternative B would require the smallest increases in capacity to serve outbound transit riders, because that alternative would provide the greatest number of dwelling units within the Downtown & Vicinity, thus reducing the demand for travel across screenlines. Alternative N would require the largest increases in capacity to serve outbound transit riders, because that Alternative would provide the smallest increase in the number of dwelling units within the Downtown & Vicinity, with none in the Project Area. Table VI.E.21 indicates the percent increases in seat capacity required between 2000 and 2020 to satisfy the load policies for the transit operators serving Downtown & Vicinity. However, as indicated in the discussions above for each transit carrier, increases in transit capacity would require new infrastructure improvements in order to operate adequately. Given the projected duration on the freeways, the addition of transit vehicle capacity alone would not mitigate the estimated impacts of travel demand in 2020.

For MUNI, capacity increases of approximately 6% to 14% would be required to satisfy MUNI's load policy of 1.25 persons per seat. No increases in capacity beyond the "reasonably assured" levels assumed for 2000 would be required for the Southwest screenline throughout the p.m. peak period. The largest increases, 11% to 14%, would be required for the Northeast screenline.

Golden Gate bus trips are not intended to carry standees, and about 17% to 25% more bus trips would therefore be required in the peak hour and about 13% to 20% more bus trips in the peak period (above the "reasonably assured" capacity level) for Golden Gate Transit's standards to be met. Either dedicated bus-only or bus / HOV lanes, or a rail transit line between downtown San Francisco and the North Bay Counties, would be required to provide this level of capacity.

AC Transit modifies schedules on its TransBay bus routes when a standard 1.25 persons per seat is exceeded. Approximately 13 to 16% more AC Transit bus trips would be required than with the "reasonably assured" capacity level to meet this standard during the peak period, and 15 to 18% more bus trips during the peak hour. Either dedicated bus-only or bus/HOV lanes on East Bay freeways leading away from the Bay Bridge would be required to provide this level of capacity. BART currently strives to deploy sufficient trains and cars per train to stay at or below 1.5 persons per seat. This standard could not

TABLE VI.E.21: PERCENT INCREASES IN TRANSIT CAPACITY REQUIRED BETWEEN 2000 AND 2020 TO SATISFY LOAD POLICIES/a/

Screenline	Transit Operator	PM Peak Hour			PM Peak Period		
		Alternative A	Alternative B	Alternative N	Alternative A	Alternative B	Alternative N
Northeast	Muni/b/	9	7	10	14	11	14
Northwest	Muni/b/	12	10	13	2	/c/	2
Southwest	Muni/b/	/c/	/c/	/c/	/c/	/c/	/c/
Southeast	Muni/b/	5	3	6	6	4	8
North Bay	Golden Gate/d/						
	Bus	25	17	24	19	12	18
	Ferry	--	--	--	--	--	--
East Bay	AC Transit/b/	18	15	18	16	13	16
	BART/b/	/f/	/f/	/f/	24 /g/	20 /g/	23 /g/
South Bay							
	BART	/c/	/c/	/c/	/c/	/c/	/c/
	CalTrain	/c/	/c/	/c/	/c/	/c/	/c/
	SamTrans	/c/	/c/	/c/	/c/	/c/	/c/

/a/ The capacity increases are based on definition of reasonably assured facilities and services for year 2000.
/b/ Based on overall average load factor standard of 1.25 persons per seat for long-range planning purposes, not more specific standards used for service planning.
/c/ No increase would be required beyond "reasonably assured" year 2000 capacity.
/d/ Based on load policy of 1.0
/e/ Based on load policy of 1.5
/f/ Capacity cannot be increased unless train control constraint of 2.25-minute headways is removed.
/g/ During the second peak hour.

SOURCE: Barton-Aschman Associates, Inc.

be met during the peak hour, as the reasonably assured capacity cannot be further expanded during the peak hour. BART would have to schedule about 20% to 24% additional ten-car trains during the second peak hour to provide more capacity and meet this objective. All transit systems across the South Bay screenlines are anticipated to operate within their load policies (see Table VI.E.21).

The impacts that projected increases in transit demand between 2000 and 2020 would have on capacity have also been defined by calculating the percent increases in capacity required between 2000 and 2020 for the transit levels of service to remain constant between 2000 and 2020. Table VI.E.22 shows what the projected capacity increases would be, if the intent were not to let service levels degrade further than projected for 2000 in Table VI.E.13, p. VI.E.98. Alternative B would, as was the case with the other indicators of change, require the smallest increases in capacity and Alternatives A or N the largest. The increases shown in Table VI.E.22 are related directly to 1) the growth in employment in the Downtown & Vicinity in relation to 2) the growth in housing in the Downtown & Vicinity and 3) changes in places-of-residence for employees of the Downtown & Vicinity projected to occur between 2000 and 2020.

OTHER POINTS OF REGIONAL CONGESTION

Continued employment and population growth, as well as changes in the region's highway and transit systems and travel patterns, would affect future levels of service and capabilities of transportation systems in San Francisco, independent of the Mission Bay Alternatives. The discussion below addresses constraint points that would occur at locations other than the regional screenlines surrounding San Francisco, because of future regional travel patterns. This presentation distinguishes between highway and transit travel conditions expected due to regional demographic, employment and transportation development factors.

Other Points of Regional Travel Congestion

Travel to or from the Downtown & Vicinity during peak periods would be affected by the LOS that would exist at several key points along the region's highways and on the region's transit systems serving San Francisco. Two types of travel constraints that could affect peak travel demand are 1) future LOS projected to occur on highway segments where congestion is already being experienced, and (2) the amount of service provided by major regional transit operators during the varying durations of peak service.

TABLE VI.E.22: PERCENT INCREASES IN TRANSIT CAPACITY REQUIRED BETWEEN 2000 AND 2020 FOR SAME LEVELS OF SERVICE AS IN 2000/a/

		PM Peak Hour			PM Peak Period		
Screenline	Transit Operator	Alternative A	Alternative B	Alternative N	Alternative A	Alternative B	Alternative N
Northeast	Muni	10	8	10	10	8	10
Northwest	Muni	10	8	11	9	8	10
Southwest	Muni	9	7	10	9	7	10
Southeast	Muni	8	7	10	9	7	11
North Bay	Golden Gate						
	Bus	20	13	19	20	13	19
	Ferry	19	15	19	27	19	24
East Bay	AC Transit	14	11	14	13	10	13
	BART/b/	14	11	14	13	10	13
South Bay							
	BART	9	6	16	11	7	13
	CalTrain	19	12	21	19	9	19
	SamTrans	11	3	28	16	7	20

/a/ Capacity defined using seats.
/b/ Capacity cannot be increased unless train control constraint is removed.

SOURCE: Barton-Aschman Associates, Inc.

Highway Congestion

Congestion is both a technical term and a subjective condition that needs to be defined to facilitate the discussion of future highway congestion. In some areas of the region, travelers expect freeways to operate at high speed, and complain that congestion is occurring whenever operating speeds drop below 55 miles per hour (mph). In other areas of the region, travelers have become accustomed to a much lower LOS, and are concerned only when operating speeds drop below 20 miles per hour.

For the purpose of this analysis, congestion is defined as the operating condition where the largest possible number of vehicles travel past a point in one hour. (The maximum throughput of vehicles occurs when the number of vehicles attempting to use the available roadway space approaches or is equal to the capacity of the roadway.) For freeways, this generally occurs when at least 1,800 vehicles per hour and more, typically 2,000 vehicles per hour, are using each freeway lane. (There are instances when 2,200 vehicles per hour per lane have traveled on a freeway.) At those volumes, the vehicles in the travel stream are generally operating at 30 mph.

By use of data generated by Caltrans, measuring when segments of freeways are operating at speeds of 30 mph or less, the existing (1985) geographic extent and duration of congestion were identified./88/ The existing duration of congestion differs among freeway segments, reflecting different demand-to-capacity relationships during the peak hour, and the in which vehicle volumes not accommodated during the peak hour have shifted to the second hour or other adjacent hours in the peak period. The duration of congestion varies between afternoon and morning hours, with more severe congestion occurring during afternoon peak hours.

Percentages of employees of the Downtown & Vicinity who would be expected to travel on congested freeway segments during the peak period would depend on future place-of-residence distributions and on future modal shares of travel. For example, while about 30% of all employees of the Downtown & Vicinity in 2000 and 2020 would travel across the East Bay screenline to their homes in the East Bay, only about 20% of those employees (or 6% of all employees in the Downtown & Vicinity) would be traveling in vehicles across the Bay Bridge, based on the modal shifts discussed on pp. VI.E.76-VI.E.79. Farther away from San Francisco, such as at the Caldecott Tunnel, the percentage of employees of the Downtown & Vicinity affected by congestion at that freeway segment would be lower than the 6% at the Bay Bridge, because some of the employees would have reached their places of residence (e.g., in Oakland).

Recent regional travel forecasts prepared by MTC provide an indication of the possible future extent of duration at regional highway bottlenecks, other than the San Francisco regional screenlines (which are described on pp. VI.E.85-VI.E.92). MTC has produced forecasts of peak-hour vehicle volumes for the years 1980 to 2000 that can be compared directly to determine the projected growth in traffic, and hence the possible increase in the duration of congestion. This method provides only an indication of the duration of p.m. peak congestion, however, because MTC has prepared forecasts of vehicle volumes only for the a.m. peak hour of travel. Another drawback of the forecasts available from MTC is that no simulation was prepared of regional travel in 1985, to allow a comparison between conditions in 1985 and 2000, similar to that done elsewhere in this analysis. Nevertheless, the following discussion of regional highway congestion points uses the increases in vehicle volumes forecast by MTC between 1980 and 2000 to provide an indication of the future duration of congestion in 2000./89/

At congested freeway segments outside San Francisco, growth in employment and population in surrounding counties and additional transportation investments would more directly affect the future duration of congestion than would growth in San Francisco employment. Possible changes in congestion are discussed below for each highway route serving San Francisco.

The I-80/I-880/I-580 Interchange in Oakland (Bay Bridge Distribution Structure) is expected to continue to be the most congested freeway interchange in the region for the following reasons:

- This freeway interchange serves more vehicles daily than any other freeway interchange in Northern California.
- Persons driving to or from San Francisco must pass through this interchange, as must persons driving from western Contra Costa County to central and southern Alameda County (or vice versa), and persons driving from northern San Mateo County to northern Alameda and western Contra Costa County (or vice versa).
- All of these travel demands are projected to increase substantially. While travelers to San Francisco, particularly the Downtown & Vicinity, would be able to find convenient transit and HOV options, travelers to or from other parts of the region would probably find planned transit services to be inadequate to serve them.

As no proposal has been made to rebuild the interchange and carry a larger number of lanes through from each freeway approach to each other freeway, the duration of congestion is expected to be similar to that projected for the Bay Bridge (see p. VI.E.89).

U.S. 101 within Marin County is expected to become more congested north of Larkspur than to the south, as job growth in central Marin County is expected to outpace job growth in San Francisco. While U.S. 101 is currently congested for about 2.25 hours in San Rafael, by 2000 that freeway segment could be congested for about 3.5 hours (an increase of 56%). To relieve congestion on U.S. 101, Marin and Sonoma Counties are currently studying alternatives that include widening the freeway for general purpose traffic or carpools, building a separate facility for buses and carpools on the Northwest Pacific (NWP) Railroad right-of-way, or building a light rail line on the NWP. However, even if funding is secured from local, state, and federal sources to build either of the bus/highway or rail/highway alternatives, U.S. 101 in the year 2005 is expected to operate at LOS D (and speeds of about 30 mph) through Central Marin County./90/

U.S. 101 south of I-380 in San Mateo is expected to become more congested, primarily because of additional growth in employment in San Mateo and Santa Clara Counties. While U.S. 101 is currently congested for about 1.25 hours, by 2000 U.S. 101 near Burlingame would be congested for about 1.75 hours (an increase of 40%). Significant increases in U.S. 101's capacity are not likely in northern and central San Mateo County, because of restricted right-of-way. Construction of new, high-capacity, continuous (bayfront) roadways to serve the large-scale developments east of U.S. 101 also is not likely, because of inter-jurisdictional disputes and environmental concerns. As a result, increasing congestion on U.S. 101 would likely divert more long-distance vehicular travel to I-280. Potential increases in transit usage that could otherwise result from freeway congestion could be dampened by transit's inability to serve low-density, dispersed employment areas in San Mateo and Santa Clara Counties. Travel to San Francisco on SamTrans buses would be affected by highway congestion, if no preferential measures are implemented, while travel shifts to CalTrain would be moderated by the need to transfer if the rail service is not extended into downtown San Francisco.

Future operating conditions on I-80 in Alameda and Contra Costa Counties would be degraded by residential growth in those two counties and in Solano County. While I-80 at the Alameda / Contra Costa County line is currently congested for about 2.5 hours, by 2000 that freeway segment could be congested to about four hours (an increase of about

60%). The potential implementation of more convenient commuter-oriented transit services, such as extension of BART and provision of HOV lanes, would tend to reduce the duration of future congestion. In November 1987, MTC identified a series of specific activities designed to implement the short-term solutions defined during the course of the I-80 Corridor Study and to continue the planning needed to implement the long-range highway and transit projects identified in the first phase of that study./91/

Operating conditions on S.R. 24 at the Caldecott Tunnel are projected to degrade less than at the other points of regional highway congestion, with the existing 1.7 hours of congestion increasing to about two (an increase of 20%). Increases planned in BART capacity would moderate increases in travel demand from central and eastern Contra Costa County to San Francisco, Oakland and other employment centers served by BART. Increases in vehicular travel would be associated primarily with travel to other areas west of Caldecott Tunnel, not served by BART, with low-intensity land uses and free or low-cost parking supply.

The growth rate in travel to or from areas of the region outside the Downtown & Vicinity would have a greater effect on operating conditions at congested highway locations outside San Francisco than would the growth rate in travel to and from Downtown & Vicinity, for two reasons. First, persons from counties outside San Francisco traveling to or from other areas of the region outside the Downtown & Vicinity depend on private vehicles far more than travelers to or from Downtown & Vicinity, who have relatively more extensive and convenient transit services. Second, there would also be many more travelers not going to or from the Downtown & Vicinity who would be using congested freeway segments outside San Francisco than there would be travelers to or from San Francisco, because intervening employment centers would be attracting increasing numbers of workers from the outer rings of the region's urbanized area.

The extent of future congestion at congested freeway segments in other parts of the region would lengthen highway travel times to San Francisco, including the Downtown & Vicinity. The possible constraint that increasing congestion would have on travel to and from San Francisco would depend on where travelers would be affected. Persons traveling to and from areas of the region outside San Francisco could shift to inter-county transit services, if no other highway options were available. Persons traveling to and from the outer areas of the region would be most directly affected by increasing congestion on the region's highway system, however, as their transit options would be the most limited, due to long travel times and the probable lack of transit carriers serving those long trips. Travelers from San Francisco to Napa, Solano, eastern Contra Costa and eastern Alameda Counties would be in this category.

Possible Transit Capacity Constraints

Numbers of transit vehicles deployed to serve travelers from and to the Downtown & Vicinity vary greatly among transit operators during peak periods, between peak periods and at other times of day. Some operators, such as MUNI, serve higher proportions of non-work trips than other operators, such as Golden Gate Transit. Some transit services, such as AC Transit's Transbay routes, are provided primarily to serve work-related trips, with the frequency of service curtailed sharply before and after the peak hour of service. Other transit systems, such as BART, may also carry a large number of commuters, but reduce the amount of service that they provide in off-peak hours by reducing the number of cars per train, and operating fewer trains.

In the future, when peak periods of highway congestion are projected to lengthen, transit operators serving the Downtown & Vicinity would have to provide more service not only to maintain their current market shares, but also to accommodate additional travelers shifting to transit (as assumed here) because of insufficient highway capacity. Operating schedules in the years 2000 and 2020 cannot be defined specifically now, but the comparison of "unconstrained auto travel demand" to auto travel capacity indicates that increases in transit service would be required at least during the current peak hour of service./92/

Persons traveling on some regional transit systems would also be competing for the available peak-period capacity with persons traveling to other areas of the region. Persons traveling to and from the Downtown & Vicinity on AC Transit's transbay bus routes, BART trains to or from the South Bay, CalTrain, Golden Gate Transit ferries, and SamTrans inter-county (express) bus routes would be served by routes or lines whose primary, and in some cases exclusive, destination / origin would be the Downtown & Vicinity. Persons traveling on some Golden Gate Transit transbay bus routes and on BART to or from the East Bay would be competing for the peak-period capacity available with persons traveling from or to employment destinations in central Marin County and Oakland. If there were not enough capacity to serve all travelers projected to travel on those systems, additional capacity could be provided by 1) scheduling more

Golden Gate Transit bus trips, and 2) deploying more trains on the BART Fremont - Richmond line, and operating additional trains on the BART Concord line to downtown Oakland.

PROJECT AREA IMPACTS, 2000

Development of the Mission Bay Alternatives would directly affect the existence or utility of transportation systems located within the Project Area. This section describes those effects, and the extent to which impacts would occur as a result of Mission Bay development versus developments projected to occur outside the Project Area.

Impacts described for the year 2000 are based on partial development of the Mission Bay Alternatives. The impacts described here for street intersections, MUNI services, rail freight, maritime-related activities, parking, and bicycle and pedestrian travel are projected to occur with implementation of the land use and transportation components presented in V. The EIR Alternatives and Approval Process, Table V.3, p. V.20.

Street Intersections

The concept of LOS (presented in the analysis of 1985 conditions) is used to describe future operating conditions for intersections within the Project Area and intersections outside the Project Area serving as freeway access points. Streets within the Project Area that would exist by 2000 are shown in Figures VI.E.11, VI.E.12, and VI.E.13.

Intersection LOS calculated for 1985 and projected for the year 2000 are indicated in Table VI.E.23, p. VI.E.144. The percentages of total intersection approach volumes forecast to begin or end within the Project Area are also shown in Table VI.E.23. Those percentages indicate the likely contribution of traffic from or to the Project Area to total traffic through intersections, on the basis of assumptions about p.m. peak period modal travel demand from the Project Area and the Downtown & Vicinity, presented on pp. VI.E.76 and VI.E.79.

The most substantial changes in intersection volumes between 1985 and 2000, independent of roadway networks in the Mission Bay Alternatives, would occur as a result of changes in traffic patterns associated with 1) tearing down the I-280 freeway stub and eliminating

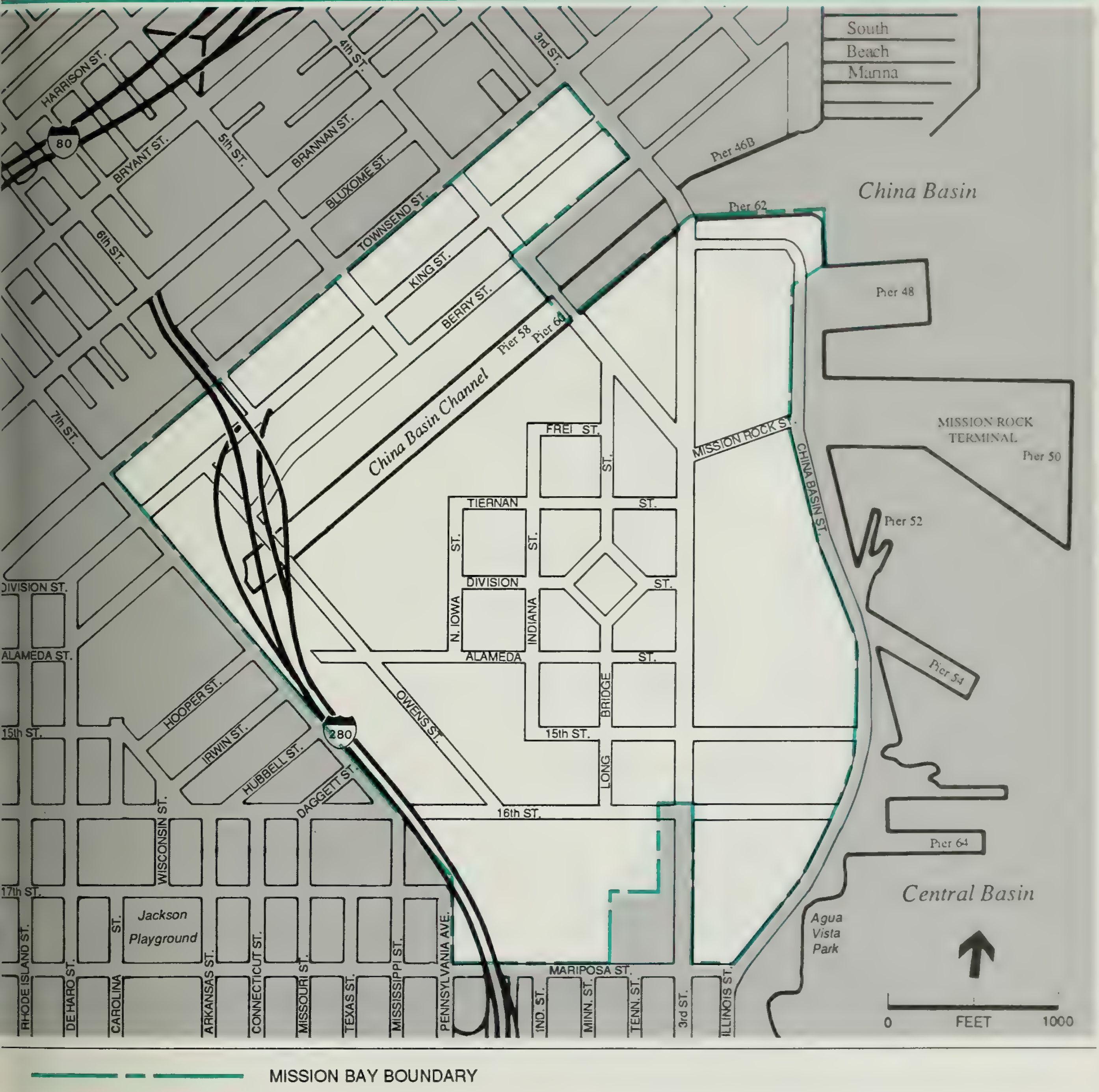
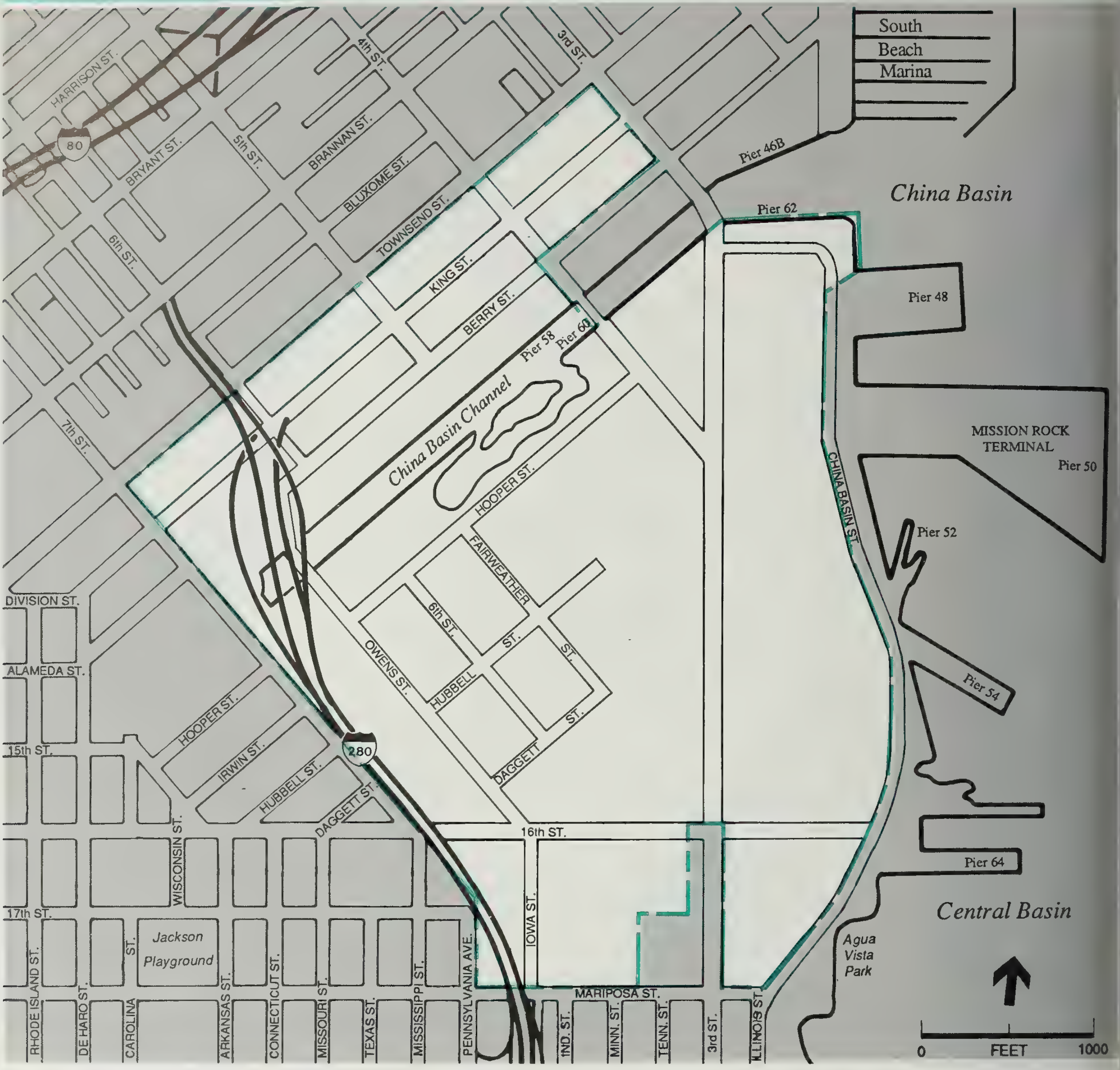

South Beach Marina
HARRISON ST.
4th ST.
3rd ST.
80
BRYANT ST.
5th ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
Pier 46B
China Basin
Pier 62
Pier 48
Pier 58
Pier 60
China Basin Channel
FREI ST.
ST.
MISSION ROCK ST.
MISSION ROCK TERMINAL
Pier 50
TIERNAN ST.
CHINA BASIN ST.
Pier 52
DIVISION ST.
N. IOWA ST.
INDIANA ST.
ALAMEDA ST.
Pier 54
HOOPER ST.
OWENS ST.
BRIDGE
15th ST.
IRWIN ST.
HUBBELL ST.
280
LONG
DAGGETT ST.
16th ST.
WISCONSIN ST.
Pier 64
17th ST.
Jackson Playground
Central Basin
Agua Vista Park
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
MARIPOSA ST.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000
MISSION BAY BOUNDARY

FIGURE VI.E.11
ALTERNATIVE A PROJECT AREA STREETS – 2000

SOURCE: Environmental Science Associates, Inc.


South Beach Marina
China Basin
Pier 46B
Pier 62
Pier 48
Pier 58
Pier 60
China Basin Channel
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
HOOPER ST.
FAIRWEATHER
OWENS ST.
6th ST.
HUBBELL
ST.
ST.
ST.
DAGGETT
CHINA BASIN ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
280
16th ST.
17th ST.
WISCONSIN ST.
Jackson Playground
ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IOWA ST.
MARIPOSA ST.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000

MISSION BAY BOUNDARY

Mission Bay

FIGURE VI.E.1
ALTERNATIVE B PROJECT AREA STREETS -
200

SOURCE: Environmental Science Associates, Inc.

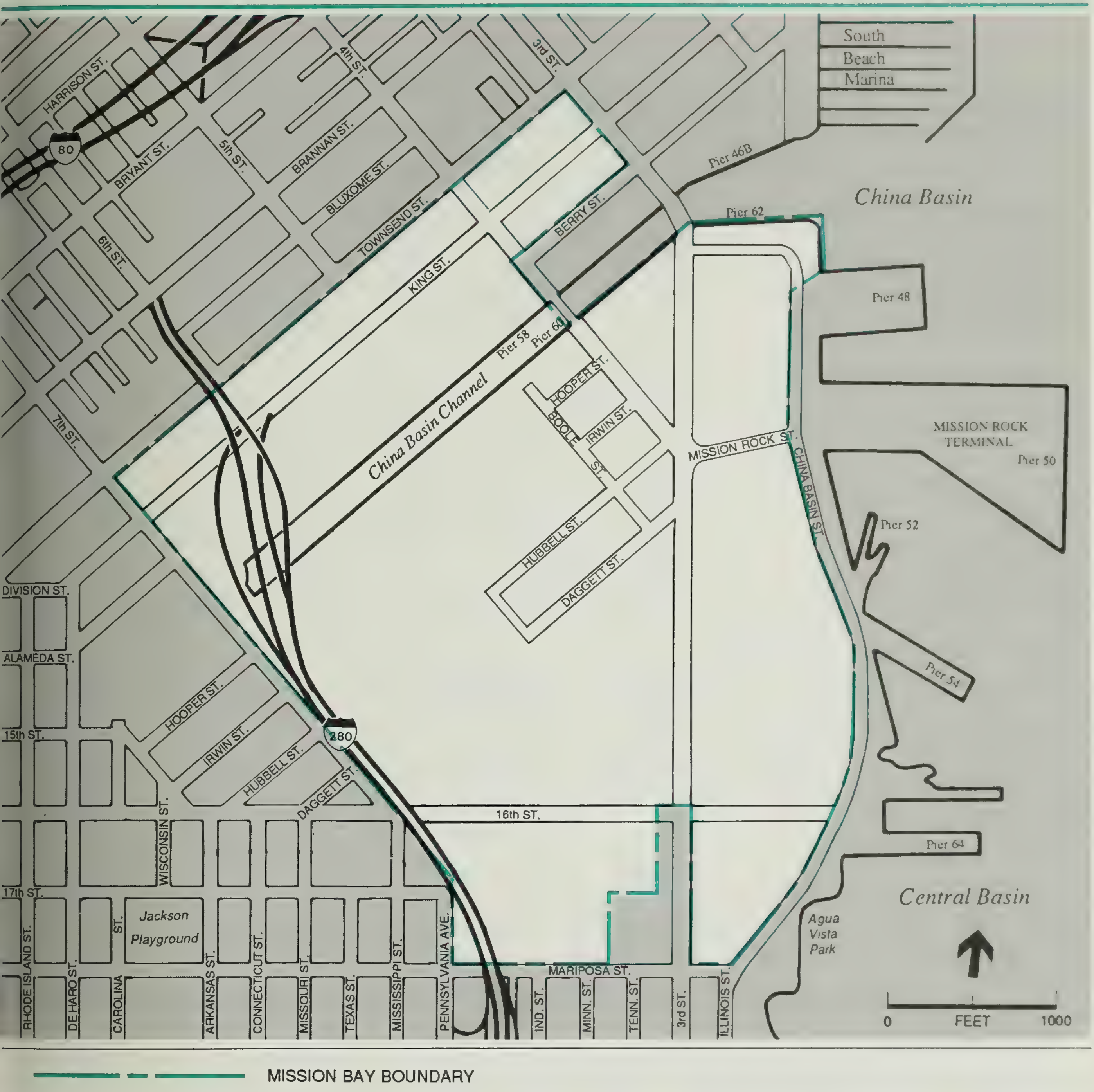

South Beach Marina
China Basin
Pier 46B
Pier 62
Pier 48
Pier 60
Pier 58
China Basin Channel
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
HARRISON ST.
BRYANT ST.
80
4th ST.
3rd ST.
5th ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
HOOPER ST.
BOOLE ST.
IRWIN ST.
MISSION ROCK ST.
CHINA BASIN ST.
HUBBELL ST.
DAGGETT ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
280
16th ST.
17th ST.
WISCONSIN ST.
Jackson Playground
MARIPOSA ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000
MISSION BAY BOUNDARY

FIGURE VI.E.13
ALTERNATIVE N PROJECT AREA STREETS – 2000

SOURCE: Environmental Science Associates, Inc.

TABLE VI.E.23: P.M. PEAK HOUR INTERSECTION LEVELS OF SERVICE, 1985 AND 2000

	1985		2000 Alternative A			2000 Alternative B			2000 Alternative		
	V/C/a/	LOS/b/	V/C/a/	LOS/b/	%/c/	V/C/a/	LOS/b/	%/c/	V/C/a/	LOS/b/	%/c
Existing Signalized Intersections in Project Area											
Third and Berry	0.98	E	0.62	B	10	0.64	B	5	0.62	B	5
Third and Fourth / Mission Rock	0.83	D	0.74	C	10	0.68	B	5	0.73	C	5
Third and Mariposa	0.74	C	0.78	C	10	0.70	B	5	0.72	C	5
Third and 16th	0.69	B	0.67	B	10	0.64	B	5	0.63	B	5
Fourth and Townsend	0.31	A	0.50	A	10	0.51	A	5	0.56	A	5
Fourth and Berry	0.63	B	0.45	A	25	0.38	A	15	0.41	A	20
Seventh and Townsend	0.52	A	0.67	B	10	0.72	C	10	0.74	C	5
New Signalized Intersections in Project Area											
Third and King	/d/	--	0.89	D	5	0.89	D	5	0.92	E	5
Third and Townsend	/e/	--	0.57	A	15	0.52	A	10	0.55	A	15
Fourth and King	/d/	--	0.85	D	10	0.86	D	5	0.89	D	5
Fifth and King	/d/	--	0.77	C	10	0.76	C	10	--	--	--
Fifth and Townsend	/e/	--	0.56	A	15	0.56	A	15	0.54	A	10
Fifth and Berry	/d/	--	0.30	A	45	0.25	A	40	0.18	A	30
Owens and Berry	/d/	--	0.29	A	50	0.25	A	50	--	--	--
Owens and Alameda	/f/	--	0.13	A	40	--	--	--	--	--	--
Longbridge and Alameda	/f/	--	0.06	A	100	--	--	--	--	--	--
Owens and Sixteenth	/f/	--	0.33	A	20	0.36	A	25	0.14	A	10
Center and Daggett	/f/	--	--	--	--	0.10	A	100	--	--	--
Fourth and Hooper	/f/	--	--	--	--	0.22	A	10	--	--	--
Sixth and King	/d/	--	0.12	A	5	0.12	A	5	--	--	--
Unsignalized Intersections in Project Area											
Seventh and 16th/Mississippi	/g/	D	0.52/h/	A	10	0.55/h/	A	10	0.38/h/	A	5
Pennsylvania and Mariposa	/g/	D	0.78/h/	C	5	0.85/h/	D	5	0.75/h/	C	5
Signalized Freeway Access Points											
First and Harrison (I-80 east on-ramp)	1.00/i/	F	1.27/j/	F	5	1.27/j/	F	5	1.27/j/	F	5
Second and Bryant (Sterling St. HOV I-80 east on-ramp)	0.37	A	0.45	A	--	0.46	A	--	0.46	A	--
Second and Harrison (to I-80 east on-ramps)	0.79	C	0.98	E	5	1.02	F	5	1.00	F	5
Fourth and Harrison (I-80 west on-ramp)	0.69	B	0.92	E	5	0.92	E	5	0.90	D	5
Fourth and Bryant (I-80 east off-ramp)	0.36	A	0.53	A	5	0.52	A	5	0.51	A	5
Fifth and Bryant (I-80 east on-ramp)	1.00/i/	F	1.46/j/	F	5	1.51/j/	F	5	1.44/j/	F	5
Fifth and Harrison (I-80 west off-ramp)	0.78	C	1.15	F	5	1.16	F	5	1.14	F	5
Sixth and Brannan (I-280 ramps)	1.00	F	0.92	E	5	0.92	E	5	0.97	E	5
Seventh and Harrison (I-80 west on-ramp)	0.60	B	0.74	C	5	0.74	C	5	0.74	C	5
Unsignalized Freeway Access Point											
Harrison and Essex (I-80 east on-ramp)	/i/	F	/i/	F	0	/i/	F	0	/i/	F	5

/a/ V/C stands for volume-to-capacity ratio.
/b/ LOS is Level of Service; ranging from A (best) to F (worst), see Appendix E for definitions.
/c/ Percent of total intersection volumes estimated to be originating in or destined to Mission Bay, rounded to nearest five percent.
/d/ 1985 counts were not taken because King and Berry Streets currently provide only local access.
/e/ 1985 counts not taken because of low volumes at this "T" intersection.
/f/ 1985 counts were not taken because the intersection does not exist.
/g/ LOS calculated represents the worst movement level of service calculated for the intersection. For unsignalized intersections, V/C ratios are not calculated.
/h/ Intersection assumed to be signalized in future.
/i/ LOS F reflects the delays induced by poor traffic flow on the Bay Bridge approaches, not the ratio of volume-to-capacity.
/j/ Future V/C calculated based on saturated V/C calculated for 1985.
SOURCE: Barton-Aschman Associates, Inc.

the off-ramp at Fourth and Berry Streets, 2) building the King Boulevard connection between The Embarcadero and the new I-280 on- and off-ramps at Sixth and King Streets, and 3) growth in vehicle trips as a result of employment and population growth projected for the Project Area, but even more so, the rest of the Downtown & Vicinity. For some intersections, the first two changes (presented above) would improve operating conditions compared to those in 1985. For King Boulevard, however, all three changes would work to create barely acceptable levels of service by 2000.

During p.m. peak hours, intersections within the Project Area would be affected primarily by the following types of traffic flows:

- On arterials, travel between the Downtown & Vicinity and Nearby Areas to the south, and Southeast San Francisco.
- On intersections leading to or directly serving freeway ramps, travel between the Downtown & Vicinity and southern San Francisco, and San Mateo and Santa Clara Counties.

Intersections within the Project Area would not be affected by statistically significant volumes of vehicles traveling entirely through the Downtown & Vicinity from or to other parts of San Francisco and other counties in the region. "Through" trips would be made on freeways, with very few of those trips projected to use intersections within the Project Area.

The LOS projected for the future p.m. peak hour represent a conservative situation. Analysis of existing conditions showed that traffic volumes at almost all intersections are higher during p.m. peak hours, and hence levels of service are worse, than during a.m. peak hours. Vehicular travel patterns (affecting the street intersections used) may not be exactly the same in a.m. and p.m. peak hours because of directionality of streets and changing relationships between vehicle demand and vehicle capacity. However, the combination of intersection volumes is expected to continue to be higher during p.m. peak hours, except for those intersections serving on-ramps or off-ramps. During p.m. peak hours, intersections serving freeway on-ramps would carry higher volumes than intersections serving freeway off-ramps, except where on-ramp traffic queues would overlap with traffic at other intersections. During a.m. peak hours, delays would occur on the freeway off-ramps, rather than on city streets.

For all Alternatives, teardown and reconstruction of the I-280 freeway terminus would create one additional freeway on-ramp in the Project Area. The existing off-ramp at

Fourth and Berry Streets would be replaced by the new on- and off-ramp at Sixth and King Streets (between Sixth and Fifth Streets). Therefore, the new on-ramp at Sixth and King Streets would represent a net gain of an on-ramp to I-280, redistributing freeway access trips. Without the new on-ramp, p.m. peak traffic volumes would be higher and operating conditions correspondingly worse at or near Sixth and Brannan Streets, or along Third and Mariposa Streets. With the new on-ramp, p.m. peak traffic would be directed toward three I-280 freeway access points instead of toward the two existing ones.

Very few differences among Alternatives are projected in p.m. peak hour intersection LOS for the year 2000, primarily because the Project Area is projected to account for less than 25% of traffic on streets connecting the Project Area with nearby Areas of San Francisco, and 5% or less of traffic at intersections serving as freeway access points. In some cases, the differences among Alternatives would be due to projected vehicle volumes that would exceed the mathematical boundary of a LOS in one Alternative (thus moving the intersection to a different LOS category) compared to other Alternatives. More important, however, is the projection that vehicle trips from or to the Project Area would in most cases represent a small component of all vehicle trips through intersections. Trips from or to the rest of the Downtown & Vicinity would represent the largest component of intersection volumes. In addition, the differences among Alternatives should not be viewed as statistically significant for intersections within the Project Area, because the street grid would provide drivers with many choices in paths to use to reach their destinations. Finally, all of the projections of intersection volumes are based on the assumption that significant shifts away from vehicular use would be made by persons traveling away from the Downtown & Vicinity (including the Project Area) during p.m. peak hours.

For existing signalized intersections within the Project Area, Levels of Service would change as follows as a result of the projected redistribution of shares of traffic from I-280's existing on-ramps at Sixth and Brannan Streets and at Mariposa Street to the three future on-ramps, including the new one at Sixth and King Streets:

- LOS would improve from E in 1985 to B in 2000 at the intersection of Third and Berry Streets, from B to A at Fourth and Berry Streets, and from D to C-B at Third / Fourth / Mission Rock Streets. LOS would continue at C (or better) at Third and Mariposa Streets and at Third and 16th Streets, as the new on-ramp to southbound I-280 at Sixth and King Streets would serve some traffic that would otherwise use southbound Third Street to reach the Mariposa Street on-ramp to travel on I-280.

- The LOS at Fourth and Townsend Streets would continue to be A, although higher vehicular volumes would be served.

- The LOS at Seventh and Townsend Streets would degrade from A in 1985 to B-C, as a result of projected increases in volumes of traffic headed southbound on a restriped Seventh Street to reach the Mariposa Street on-ramp to I-280, instead of trying to use the congested on-ramps at Sixth and Brannan Streets and on King Boulevard.

- Intersections along King Street would be operating at LOS E-F at Third Street, D at Fourth Street, and C at Fifth Street, because of the new freeway- and local-access functions of this roadway.

All other intersections within the Project Area would be operating at LOS A or B, especially when the intersecting streets would be predominantly serving trips to or from the Project Area. The only exceptions would be those intersections noted above and the intersection of Pennsylvania Avenue and Mariposa Street.

The intersections of Mariposa Street and Pennsylvania Avenue and Seventh / 16th / Mississippi Streets are assumed to be signalized between 1985 and 2000. The projected increase in traffic headed for I-280 and for Potrero Hill around the western boundary of the Project Area would cause the LOS to remain at C-D for the intersection of Mariposa Street and Pennsylvania Avenue. The assumed increase in lanes on Seventh Street, together with signalization, would improve the LOS for the intersection of Seventh / 16th / Mississippi Streets from D in 1985 to A in 2000.

LOS for all intersections serving as freeway access points outside the Project Area would degrade between 1985 and 2000, except for Sixth and Brannan Streets. LOS would degrade from C in 1985 to E in 2000 at Second and Harrison Streets, from B to D-E at Fourth and Harrison Streets, from C to F at Fifth and Harrison Streets, and from B to C at Seventh and Harrison Streets. LOS would remain at F at First and Harrison Streets and at Fifth and Bryant Streets, and at A at Second and Bryant Streets and Fourth and Bryant Streets, albeit with higher volume-to-capacity ratios. All of those changes would result from the approximately 35% to 50% increase projected between 1985 and 2000 in vehicle volumes at those intersections. The LOS would improve from F to E at Sixth and Brannan Streets because of a slight reduction in p.m. peak volumes between 1985 and 2000, resulting from the addition of the new I-280 on-ramp at Sixth and King Streets.

As indicated in Table VI.E.23, p. VI.E.144, most intersections within the Project Area would be at acceptable LOS during the p.m. peak hour in the year 2000. Those conditions are projected despite substantial growth in the Project Area's employment (with all Alternatives) and population (with Alternatives A and B).

The forecasts of p.m. peak-hour conditions result from the assumed increase in transit and rideshare modes for travel from the Downtown & Vicinity, as well as continued peak-hour vehicle travel demand from the Downtown & Vicinity that is much lower than peak-hour vehicle travel demand recorded in other major employment centers in the region. Those assumptions are consistent with historical trends in travel behavior for the Downtown & Vicinity that reflect both 1) the already noted constraining effects that congested bridges and freeways have on the Downtown & Vicinity's peak-hour and peak-period vehicle trip generation rates, and 2) the modal diversions created by those same highway capacity constraints. Although the modal shares projected for the Downtown & Vicinity would be unprecedented since the bridges and freeways were built, the modal shifts are based on observed relationships between highway and transit volumes.

With respect to the Project Area's contribution to intersection congestion during the p.m. peak hour in the year 2000, Alternative A would contribute a somewhat higher share than B, and N would contribute less than either A or B. However, with any of the Alternatives, the Project Area would not contribute more than 5% of the traffic to any intersection with a LOS worse than D. The Project Area is projected to contribute 5% or less of the traffic at intersections serving as freeway access points. The impact of traffic generated in 2000 by the Project Area on major intersections in Nearby Areas, particularly residential streets, would not be statistically significant with any of the Alternatives. By 2000, few drivers would seek out new parallel routes through local or collector streets in the Nearby Areas, as those streets would not offer a travel time advantage over the operating conditions projected for the intersections within the Project Area.

Transit

Forecasts of total transit riders using MUNI routes serving the Mission Bay Project Area are based on the following assumptions about travel conditions:

- Forecasts of ridership for each MUNI route are for the maximum load point; i.e., the stop where the largest number of riders would be on the bus or Metro. The maximum load point would occur between the Project Area and Market Street.
- Forecasts of cumulative ridership are based on separate forecasts for each component of travel./93/
- For routes serving the CalTrain station at its present location with Alternative N--15-THIRD, 30-STOCKTON, Metro, 42-DOWNTOWN LOOP, 47-VAN NESS, and 81X-BATTERY SANSOME EXPRESS--the shares of CalTrain riders

projected to use each route are derived from the CalTrain Station Locations (Study). The same basis is used for routes serving the CalTrain Station at its new location with Alternatives A and B -- Metro, 30-STOCKTON, 47-VAN NESS, and 81X-BATTERY SANSOME EXPRESS.

- For routes continuing through the Project Area to serve southeast San Francisco -- 15-THIRD in all Alternatives, and 30-STOCKTON in Alternatives A and B -- the increase in ridership between 1985 and the future year is based on the same growth rate used to forecast travel from the Downtown & Vicinity at the MUNI screenlines.

- For all routes serving the Project Area, the number of southbound p.m. peak trips destined to Mission Bay assigned to each route is based on the forecast of work-related travel between Mission Bay and other areas of San Francisco./93/

Forecasts of p.m. peak-period and p.m. peak-hour MUNI riders in the peak direction of travel, southbound from the rest of the Downtown & Vicinity toward the Project Area, or eastbound from Nearby Areas toward the Project Area, are shown in Table VI.E.24. Those forecasts provide an indication of the LOS that would be expected on individual MUNI routes serving the Project Area. Those transit forecasts complement the forecasts of vehicular travel at intersections and indicate the LOS that would be provided in 2000 to serve the component of MUNI travel to and from the Project Area. The individual route ridership forecasts should not be viewed as definitive, as forecasts for groups of routes serving the same area are more reliable.

LOS would vary more among routes than among Mission Bay Alternatives. As routes that would serve the Project Area in the future in the future would differ in many cases from routes that currently serve the Project Area, it is not possible to present a direct comparison of existing vs. future Levels of Service. Future operating conditions in the p.m. peak period, measured at the maximum load point between Mission Bay and the core of downtown, would be as follows:

- The LOS on routes 15-THIRD and 42-DOWNTOWN LOOP (included only with Alternative N) would remain at D between 1985 and 2000. Passenger-carrying capacity on these routes is assumed to increase by about 40% as a result of deploying only articulated buses and maintaining current headways. Ridership growth on both routes between 1985 and 2000 would be tempered by the provision of MUNI Metro service.

- The LOS on the 30-STOCKTON would degrade slightly from C in 1985 to D in 2000 with Alternatives A and B and would remain at C with Alternative N. The 30-STOCKTON is also assumed to have its capacity increased by about 40% as a result of deployment of only articulated trolley coaches and maintaining

TABLE VI.E.24: CUMULATIVE DEMAND AND CAPACITY FOR MUNI ROUTES SERVING THE PROJECT AREA, 2000/a/

Route	Capacity/b/	Alternative A Demand	Alternative A D/C/c/	Alternative A LOS/d/	Alternative B Demand	Alternative B D/C/c/	Alternative B LOS/d/	Alternative N Demand	Alternative N D/C/c/	Alternative N LOS/d/
PEAK PERIOD										
15 -- THIRD	1,960	2,250	1.15	D	2,250	1.15	D	2,400	1.22	D
22 -- FILLMORE	855	925	1.08	D	925	1.08	D	/e/	--	--
30 -- STOCKTON	2,925	2,975	1.02	D	3,025	1.03	D	2,300	0.79	C
Metro	4,760	3,425	0.72	B	3,625	0.76	C	2,625	0.55	B
42 -- DOWNTOWN LOOP	855	/e/	--	--	/e/	--	--	1,000	1.17	D
47 -- VAN NESS	855	1,250	1.46	E	1,300	1.52	F	/e/	--	--
76 -- MARIN HEADLANDS	Sunday Service Only									
81X -- BATTERY-SANSOME ESPRESS	630	700	1.11	D	700	1.11	D	600	0.95	C
PEAK HOUR										
15 -- THIRD	1,125	1,300	1.16	D	1,300	1.16	D	1,400	1.24	D
22 -- FILLMORE	460	550	1.20	D	550	1.20	D	/e/	--	--
30 -- STOCKTON	1,700	1,725	1.01	D	1,750	1.03	D	1,350	0.79	C
Metro	2,400	2,000	0.83	C	2,125	0.89	C	1,525	0.64	B
42 -- DOWNTOWN LOOP	460	/e/	--	--	/e/	--	--	575	1.25	D
47 -- VAN NESS	460	725	1.58	F	750	1.63	F	/e/	--	--
76 -- MARIN HEADLANDS	Sunday Service Only									
81X -- BATTERY-SANSOME EXPRESS	315	400	1.27	E	400	1.27	E	350	1.11	D

/a/ Cumulative demand projected to occur at the maximum load points measured between Mission Bay and Market Street.
/b/ The unit of seats has been used to define capacity.
/c/ Demand-to-capacity ratio (D/C) equals passengers per seat, measured between the Project Area and Market Street.
/d/ Level of Service, as defined in Transportation Research Board Circular 212. See Appendix E for details.
/e/ This route would not be operated in the Project Area under this Alternative.

SOURCE: Barton-Aschman Associates, Inc.

current headways. Ridership growth would be a result of growth in travel 1) from the Downtown & Vicinity to the CalTrain station in all Alternatives, plus 2) to the residential land uses in Mission Bay and Potrero Hill with Alternatives A and B.

- The LOS on the 81X-BATTERY-SANSOME EXPRESS would be degraded from C in 1985 to E in 2000 with Alternatives A and B and to D with Alternative N, as a result of growth in travel between the Financial District and the CalTrain station. (With Alternatives A and B, the 81X would also serve residents of Mission Bay working in the Financial District.) This route's passenger-carrying capacity is not assumed to increase, as it would continue to be served by standard-size buses. (However, as Route 81-X is operated by MUNI under contract to Caltrans to provide dedicated shuttle service between the CalTrain terminal and the Financial District, its capacity could be changed more directly than could that of other MUNI routes.)

- The MUNI Metro would generally operate at LOS B with Alternative N, and with Alternative A during the peak period, and at LOS C with Alternative B, and Alternative A in the peak hour. The MUNI Metro is projected to attract only portions of travel between the downtown core and the Project Area, as other MUNI routes would continue to provide faster travel times by virtue of their more direct alignment to the CalTrain station and the Project Area. (In this analysis, ridership on the MUNI Metro is also based on its terminus being at the CalTrain station, so that major sections of the Project Area south of China Basin Channel would not be within walking distance of a Metro station.)

- The lowest (poorest) LOS (E-F) is projected for the 47-VAN NESS, as this route would provide the most direct connection (in Alternatives A and B) from the Civic Center/ Van Ness areas to the Project Area. Although the 47-VAN NESS is assumed to operate with a fleet of articulated buses operating at current headways, the increase in capacity between 1985 and 2000 would be neutralized by a larger increase in demand.

The LOS presented in Table VI.E.24, and discussed above are calculated on the basis of having an average of 1.25 persons per seat define the measure of capacity during the two-hour peak period, for long-range planning purposes. For (current) service planning purposes, however, MUNI adjusts schedules when bus trips exceed 1.3 persons per seat on a standard bus, 1.65 persons per seat on articulated buses, and when Metro and streetcar trips exceed 1.8 persons per seat, measured for quarter-hour averages during the two-hour peak period. MUNI's capital development plan is predicated on the strategy of providing more spaces rather than more seats on the most intensively used routes. This is to be accomplished by replacing standard-size buses with articulated buses, and if warranted by demand, replacing buses with Metro service. With MUNI's measure of seated and standing (passenger) spaces applied to identify capacity, the MUNI routes serving the Project Area would have the following related capacities:

- Articulated buses or trolley coaches would each accommodate about 96 persons (sitting and standing), the capacity recognized by MUNI for scheduling purposes, vs. 71 persons on buses, with a load factor of 1.25 persons per seat defining the acceptable LOS. Each would represent an increase of 35% (when compared to the LOS D capacity used in this analysis).

- During quarter hours of the peak period, standard buses or trolley coaches would on the average accommodate about 52 persons (sitting and standing using MUNI's service standard), vs. 50 persons using the LOS D service standard. That change in the definition of capacity would represent a difference of only 4% between the two definitions of acceptable capacity.
- On the basis of a 15-minute average, light rail vehicles would accommodate about 122 persons, using MUNI's detailed service standard, vs. 85 persons, using the planning standard used in this analysis. MUNI's detailed definition of capacity would be about 44% higher than the one used in this analysis.

Only Routes 47-VAN NESS and 81X-BATTERY/SANSOME are projected to exceed the LOS D standard of 1.25 persons per seat during the peak hour. Travel demands on other routes serving the CalTrain terminal and the downtown core could increase more than projected here, if capacity on Route 81X is not expanded. Similar route choices are not assumed for travelers assigned to the 47-VAN NESS between the Civic Center / Van Ness area and Mission Bay.

Rail Freight Facilities

Demand for rail freight access is assumed to continue to be required from the lead tracks in the Project Area (see pp. VI.E.20-VI.E.25). Rail freight movements to and from San Francisco declined between 1985 and 1987, but are expected not to change between 1987 and 2000. At the same time, rising land costs in the City make it unlikely that major new industrial rail freight users would locate in the Project Area or its vicinity, and recent rail carrier marketing studies report declines in the number of San Francisco accounts./95/

Within Mission Bay and its immediate vicinity there are three activity groups using rail freight service: building materials, manufacturing / distribution, and maritime. The shipment of building materials accounts for the largest number of carloadings, and consists of materials such as rock, sand, gravel, and cement. As demand is strong in San Francisco for those construction materials, those rail car loadings are expected to remain at current levels through the year 2000./96/

The next largest group of rail freight users are existing light industrial companies and wholesale distributors. The majority of those businesses have made considerable investments in their current locations, and are dependent upon rail shipment for their survival. The decline in San Francisco boxcar loadings has stabilized in the past three years, and is not expected to continue. Therefore, rail freight car demand from this group is expected to continue at current levels./97/

The final rail freight user group includes maritime export/import businesses who use rail freight services in the vicinity of the Port of San Francisco. The dedication of a new Intermodal Container Transfer Facility (ICTF) at the Port's South Terminal at Islais Creek may increase piggyback rail and container truck traffic south of the Project Area. North of Islais Creek, maritime rail traffic would consist of rail car shipments to and from the Port's North Container Terminal via the 16th Street connection through the Project Area to the Illinois Street lead. Such shipments are expected to increase through the year 2000./98/

Alternative A

By the year 2000, the proposed development of Alternative A would affect the railroad network in the Project Area as follows:

- The CalTrain station and S.P. maintenance yards at Fourth and Townsend Streets would be abandoned.
- The (SP) Peninsula mainline would be shortened, with the new terminus at Seventh and Channel Streets, approximately 1,000 feet north of 16th Street. The King Street connection to the San Francisco Belt line along the Embarcadero would be abandoned, since the new CalTrain station (at Seventh and Channel Streets) would become the terminus of the mainline.
- The lead to the ATSF Illinois Street tracks in the Project Area and the lead to the Indiana Street tracks south of the Project Area would remain operational (see Figure VI.E.5, p. VI.E.21).

The industrial lead track connecting the mainline to the Port's North Container Terminal via Illinois Street at 16th Street could remain in service, since that track traverses an area of the project proposed for S/LI/RD uses (along 16th Street east of Third Street). Development of that area would not preclude continued use of the 16th Street lead track. The two industrial leads that provide rail freight service to the Inner Mission via 16th Street and the WP tracks to Florida and Harrison Streets would also be unaffected by development of Alternative A.

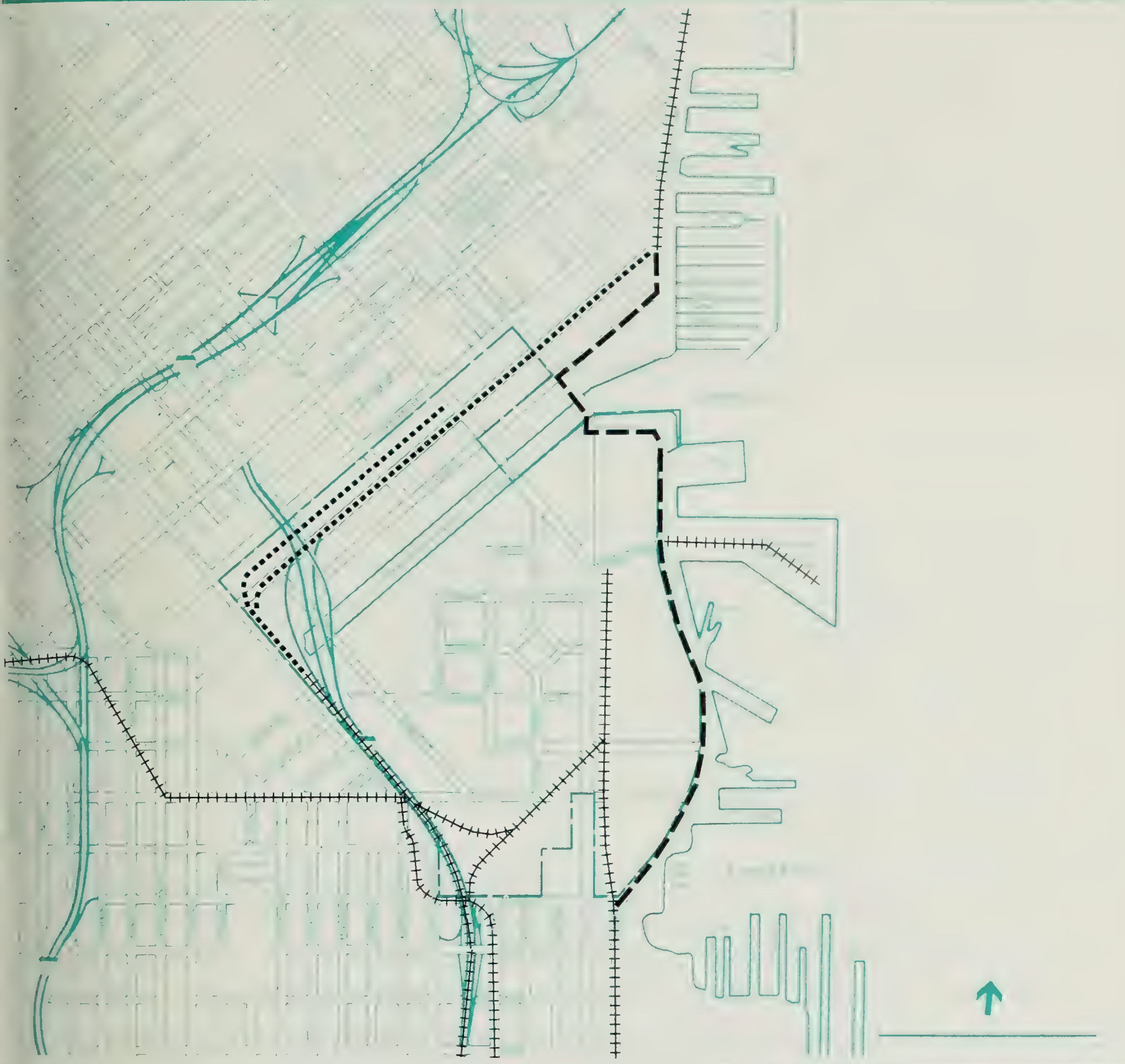
The maximum length of trains that could use the Indiana Street lead would be reduced to approximately 1,000 feet (11 cars) by the CalTrain station relocation. Currently there is no physical limitation on the length of trains. However, since trains currently running to the Port's North Terminal have comparable train-length limitations at the SF-SP Illinois Street Interchange Yard, and since the Port's North Terminal rail operations are not now hampered by that limit, this is not considered a significant impact.

The Port of San Francisco has proposed that a rail connection be provided to the North Terminal either along Army Street or across Islais Creek, but has not secured funding for that project. The Indiana Street line would not be necessary, and could be abandoned, if that optional connection were built. The connection between the Peninsula mainline and the Illinois Street lead to the Port's North Terminal, which could be required after 2000 with both Alternatives A and B, could be provided as follows:

- Build a new rail bridge across Islais Creek Channel that would connect the Quint Street lead serving the Port's Intermodal Container Transfer Facility (at the South Terminal) with the Illinois Street lead. The new trackage would have the advantage of providing a rail freight connection between the Port's North and South Terminals on Port property./99/
- Connect the Peninsula mainline with Western Pacific's abandoned track along Army Street. That connection would require construction of new track on private property.

Alternative A would require construction of track to maintain rail freight service to the Northern Waterfront. The following way is proposed to continue serving the Belt Line north of Mission Bay through the year 2000: beginning at the mainline south of 16th Street, the existing connection to the Illinois Street lead at Eldorado Street and the existing track on Illinois Street would intersect a new lead to be constructed along China Basin Street. That new lead track on China Basin Street would connect at Third Street with a reconditioned lead crossing the Lefty O'Doul (Third Street) Bridge to Berry Street. Reconditioned track on Berry or King Street would connect the new line to the Belt Line tracks on The Embarcadero (see Figure VI.E.14).

The new track along China Basin Street would retain rail freight service to the Northern Waterfront at current and expected future volumes of freight car loadings. The very small number of freight carloads expected on that new rail lead (approximately one a week) would be compatible with proposed open space uses along China Basin Street, and would not create operational problems at the Lefty O'Doul drawbridge over China Basin Channel. The amount of time that traffic on Third Street would be delayed by that train movement would be very similar to that due to bridge openings.



— — — MISSION BAY BOUNDARY

▬ ▬ ▬ NEW OR RECONDITIONED TRACK

┼┼┼┼┼┼ EXISTING TRACK

•••••••• ABANDONED TRACK

NOTES: The Indiana Street line (one block east of I-280) joins the Illinois Street line (one block east of Third Street) near 25th Street and continues south to serve the Port of San Francisco.

The line west of Division Street splits to follow Florida Street south to 18th Street and Harrison Street south to 23rd Street.

The Embarcadero line continues to the Northeast Waterfront.

FIGURE VI.E.14
ALTERNATIVE A RAIL TRACKAGE – 2000

SOURCE: Barton-Aschman Associates, Inc.

Alternative B

Changes to rail freight facilities and services for Alternative B would be similar to those for Alternative A in the year 2000, including the construction of the aforementioned new rail line to the Northern Waterfront via China Basin Street and the Lefty O'Doul Bridge. However, full build-out of Alternative B may require that the Indiana Street lead be preserved for future use beyond the year 2000 (see further discussion beginning on p. VI.E.178). Figure VI.E.15 illustrates freight rail access under Alternative B.

Alternative N

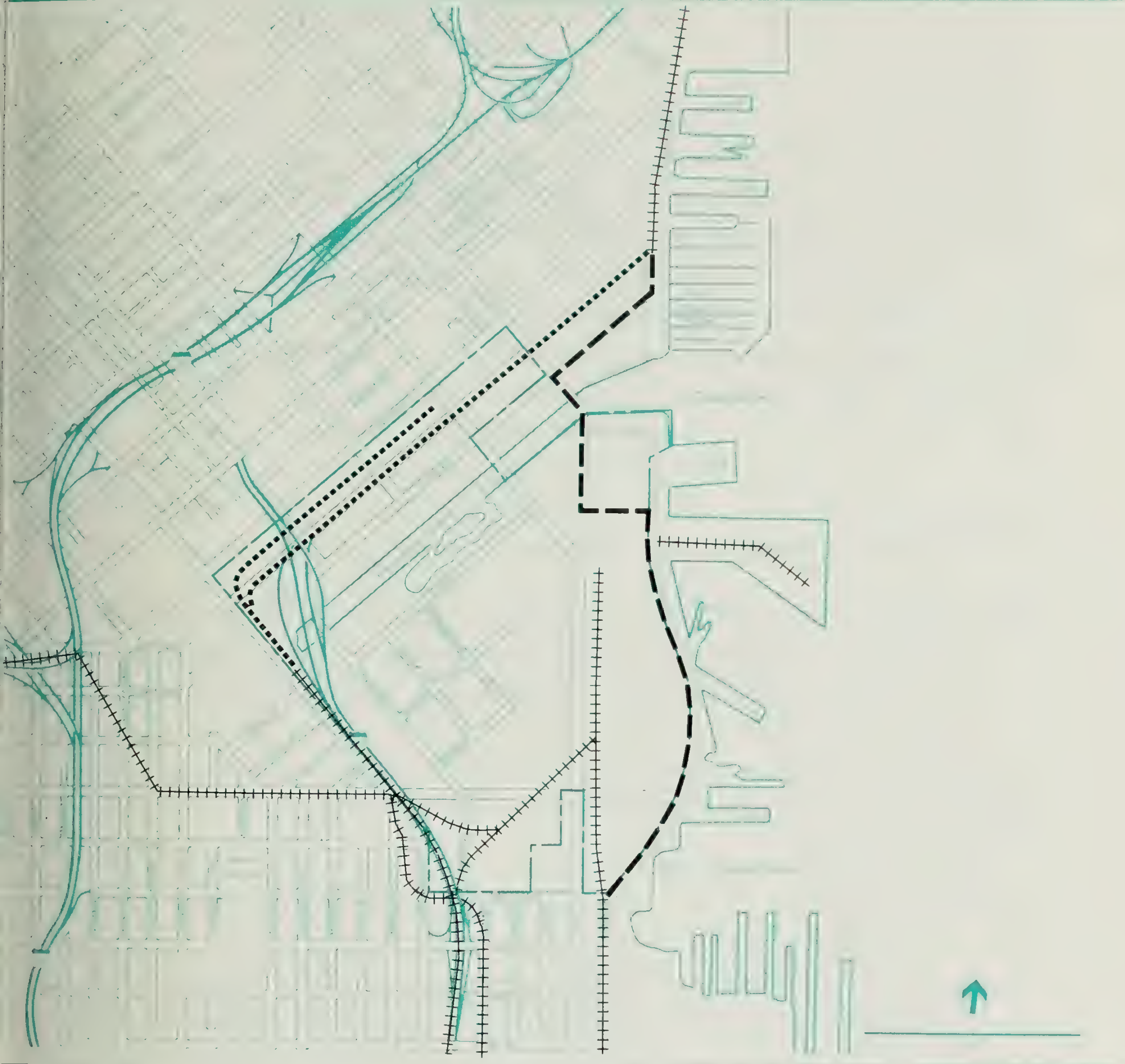
Most existing trackage and yards could continue to exist with Alternative N. Rail connections to the Northern Waterfront and Central Waterfront would continue as in 1987, except that the King Street (SP) lead to the Belt Line would have to be relocated to implement the I-280 Transfer Concept Program. The optional ways of accommodating the connection on a reconstructed King Street or on Berry Street are described on p. VI.E.68.

Maritime Facilities and Services

Discussion of how the Mission Bay Alternatives would affect the use of lands currently used for maritime activities is presented in VI.B. Land Use, Business Activity, and Employment, p. VI.B.101-104, and pp. VI.B.115-117. This section describes the impacts that the Alternatives would have on the transportation functions of piers and backlands. No major new maritime facilities or services would be built in this portion of the Port by the year 2000. Existing pier, wharf and backlands facilities currently in use would be maintained for continued maritime uses, except as noted below with Alternatives A and B.

The design concept for China Basin Street incorporated in Alternatives A and B could reduce the ability of trucks to use that roadway, depending on whether the current roadway width is maintained and only two travel lanes are striped or the roadway itself is narrowed down.

Trucks serving the piers and maritime-related and other business activities along China Basin Street use the curb lanes of that street as loading and parking zones. The current "unofficial" four-lane width of this roadway is also used to turn around semi-trailer trucks.



— – — MISSION BAY BOUNDARY

▬ ▬ ▬ NEW OR RECONDITIONED TRACK

┼┼┼┼┼┼┼┼┼ EXISTING TRACK

▪▪▪▪▪▪▪▪▪▪ ABANDONED TRACK

NOTES: The Indiana Street line (one block east of I-280) joins the Illinois Street line (one block east of Third Street) near 25th Street and continues south to serve the Port of San francisco.

The line west of Division Street splits to follow Florida Street south to 18th Street and Harrison Street south to 23rd Street.

The Embarcadero line continues to the Northeast Waterfront.

FIGURE VI.E.15
ALTERNATIVE B RAIL TRACKAGE – 2000

SOURCE: Barton-Aschman Associates, Inc.

Alternative A

By the year 2000, the development of Alternative A would result in potential decreases in maritime-related activity in Mission Bay, because lands currently used for parking, storage, maritime-equipment maintenance and supply, and other maritime-related activities would be converted to other uses. (For additional detail, see VI.B. Land Use, Business Activity and Employment, p. VI.B.93). The potential relocation of businesses requiring extensive nearby space for those activities would reduce some truck and other vehicle traffic from streets in the Project Area. That amount of traffic is considered small in relation to the total traffic volumes on Project Area streets, however, and was therefore not estimated separately. Some of that maritime-related traffic would increase on streets in the vicinity of the Port of San Francisco Container Terminals (North and South) and some outside San Francisco.

Many of the maritime-related firms in the Project Area generate traffic to and from the Port of San Francisco Container Terminals (North and South). Some firms would relocate south to the vicinity of these terminals and other firms would relocate elsewhere in the Bay Area to locations with port access. As a result of those relocations, maritime-related truck volumes on streets in the Project Area would decrease. However, truck activity on China Basin Street would be likely to continue using the roadway width for loading and parking.

Alternatives B and N

Maritime-related activities are forecast not to change from 1985 to 2000 with Alternatives B and N. Maritime-related traffic volumes would, therefore, also not change from 1985.

Parking

Parking impacts are measured by comparing the accumulation of parked cars throughout the day against the supply of parking spaces available. The analysis focuses on parking impacts within and generated by development in the Project Area. Qualitative description of parking implications for areas immediately adjacent to the Project Area is also provided. Unlike the p.m. peak travel patterns discussed in earlier sections, parking accumulation tends to reach its peak before 3:00 p.m. As a result, the peak period for parking demand is not equivalent to the 4:00 to 6:00 p.m. peak period for travel demand analyzed in the transportation impact section.

In the travel demand and traffic impacts analysis, definition of project-level traffic impacts was based on the same modal shares derived for the MUNI and regional screenline analysis. Because of modal shifts expected to be made by travelers from the Downtown & Vicinity during the 4:00 to 6:00 p.m. period, approximately 30% of all outbound travel from the Downtown & Vicinity would be in private vehicles and the remainder in transit. In this parking analysis, the same 30% auto mode share is used to estimate the demand for parking in the Project Area in 2000 and 2020 generated by employees who travel during the peak period. Non-peak period travelers are assumed to have a higher auto mode share in both analysis years, reflecting a lower propensity to use transit.

The partial amount of development projected to the year 2000 could result in vacant lands within the Project Area to be developed on an interim basis as at- grade (surface) parking, thus encouraging the use of automobiles for non-peak and visitor trips to the Project Area. As the amount of interim parking is unknown at this time, the parking demand formula does not use different auto mode splits for either analysis year. For additional detail, see Appendix E. p. XIV.E.29.

Parking Supply

Since the parking space requirements to be applied to the Project Area are not yet set by ordinance, the amount of off-street parking required per unit of floor area for non-residential land uses for Alternatives A and B was defined according to the parking supply rates defined in the Mission Bay Plan Proposal for Citizen Review (January 1987). For Alternative N, the parking supply rates assumed in this analysis are based on existing requirements pursuant to Section 151 of the San Francisco Planning Code. The supply rates and resulting amounts of off-street parking to be constructed in the Project Area are shown in Table VI.E.25.

For residential uses, a supply rate of 1.0 parking space per dwelling unit was used. To verify whether this rate would be adequate to meet residential parking demands for Alternatives A and B, a review was conducted of 1980 Census data for auto ownership per dwelling unit in areas of San Francisco with population density (persons per occupied dwelling unit) similar to that projected for Mission Bay. That review was supplemented with a review of available field surveys of similar residential developments existing in San Francisco./100/ This review found that one off-street parking space per dwelling unit

TABLE VI.E.25: PROJECTED OFF-STREET PARKING DEMAND AND SUPPLY, 2000

	Alternative A					Alternative B			Alternative N			
Land Use	Supply Rates	Demand Rates/a/	Supply/b/	Demand/c/	(Shortage) or Surplus	Supply/d/	Demand	(Shortage) or Surplus	Supply Rates	Supply	Demand	(Shortage) or Surplus
NEW												
Office	1/1,000 s.f.	1.35	1,440	1,942	(502)	1,000	1,349	(349)	2/1,000 s.f.	2,000	1,349	651
S/LI/R&D	1/1,000 s.f.	0.9	1,330	1,208	122	0	0	0	N/A	0	0	0
M-2 Industrial/e/	varies	varies	295	257	38	443	439	4	0.67/1,000 s.f.	1,473	1,247	226
Port-Related M-2	0.67/1,000 s.f.	0.63	0	0	0	0	0	0	0.67/1,000 s.f.	0	0	0
Retail	1/1,000 s.f.	1.57	50	79	(29)	40	63	(23)	1/1,000 s.f.	65	102	(37)
Hotel	0.4/hotel room	0.84	200	420	(220)	0	0	0	N/A	0	0	0
Community Facilities	1/1,000 s.f.	1.00	37	37	0	42	42	0	0.67/1,000 s.f.	0	0	0
Train Station/f/	N/A	0.04	0	208	(208)	0	204	(204)	N/A	0	264	(264)
Housing/g/	1/D.U.	1.00	2,825	2,825	0	2,705	2,705	0	N/A	55	55	0
Subtotal, all uses			6,177	6,976	(799)	4,230	4,802	(572)		3,593	3,017	576
On-Street Parking/h/					650			400				290
NET TOTAL					149			172				866

/a/ Per 1,000 square feet of floor area, dwelling unit, or hotel room except for the train station, which is per daily boardings. See Appendix E. p. XIV.E.29 for details.
/b/ Supply is for building areas in Chapter V. The EIR Alternatives and Approval Process, using above supply rates.
/c/ Demand based upon parking demand ratios developed by Barton-Aschman Associates, Inc. (See Appendix E. Table XIV.E.8, p. XIV.E.31), and building areas described in V. The EIR Alternatives and Approval Process.
/d/ Supply ratio same as for Alternative A.
/e/ This category is a composite of parking supply and demand for new M-2 space as well as existing M-2 space that would still remain on the Project Area in 2000.
/f/ Estimate of parking demand based on CalTrains survey data.
/g/ Includes houseboats and pleasure boat berths. Demand rate of one space per unit based on comparable San Francisco housing surveys.
/h/ On-street parking spaces are defined as within 1,500 feet of non-residential uses, excluding curb spaces on residential streets. See impacts text for full description of on-street parking spaces.

SOURCE: Barton-Aschman Associates, Inc.

would be adequate for the type of housing proposed in the Mission Bay Alternatives, if on-street parking spaces in the vicinity of the residential units are available for use by visitors, and service vehicles and residents./101/.

For the San Francisco CalTrain terminal, no parking supply rate was established, since there is no public parking supply currently provided, other than on-street parking.

As Table VI.E.25 indicates, the amount of new development in the year 2000 would provide approximately 6180, 4230, and 3590 off-street spaces for Alternatives A, B, and N, respectively, including parking supplied as part of existing land uses that would remain in the year 2000.

In addition to off-street parking, construction of new streets in the Project Area would add on-street parking supply./102/ A portion of this curb parking supply would be available to help meet year 2000 parking demands generated by new and existing land uses in the three Alternatives. Not all of the on-street parking would be available for Project Area demand, as some of this supply would likely be used as "intercept parking" (parking by persons with both origins and destinations outside the Project Area). Estimates of on-street supply available for Project Area parking demand were made, based on the following considerations:

- Curb space on residential streets was assumed reserved for residential uses and not counted as available on-street parking for commercial uses. This threshold allows identification of spillover parking impacts from non-residential uses (e.g., commercial, office,) on residential streets.

- Areas beyond 1,500 feet from non-residential uses in the Project Area were deemed "not available" for curbside parking supply, because they were considered beyond an average acceptable walking distance for Project Area employees.

- Curbside parking on Project Area boundary streets was not counted, because that supply is assumed to be already in use by parking demand generated in the vicinity of the Project Area.

- Curbside spaces on streets with traffic flow parking restrictions, such as King Boulevard and Third Street, were also excluded from the on-street parking supply.

Based on the above considerations, an estimated 650 on-street spaces in Alternative A, 400 in Alternative B, and 290 in Alternative N could be used to accommodate some of the parking demand generated by the year 2000 in the Project Area.

Parking Demand

The amount and cost of parking have a great influence on a commuter's choice of travel mode for the journey to work. To establish the daily demand for non-residential off-street parking for employees who travel during the peak commute period, the mode choice was assumed to be the same as for the screenline travel demand analysis. Non-peak-period parking demand rates were developed based on survey data by land use collected in the South of Market area. For residential uses, parking demand was based upon field studies and census data for existing residential development in San Francisco similar to the residential development proposed in Alternative A and B./100/ The parking demand forecasts are shown in Table VI.E.25, p. VI.E.160. A more detailed explanation of the methods used to estimate demand is presented in Appendix E. p. XIV.E.29.

In 2000, the ratio of parking demand to supply would result in a small parking deficit for the Project Area in Alternatives A (150 spaces) and B (170 spaces), and a relatively large parking surplus in Alternative N (870 spaces). These calculations shown in Table VI.E.25, p. VI.E.160 include parking supply and demand for existing uses remaining in the Project Area at that interim year, taking into account the use of the estimated available supply of on-street parking. Apart from the overall Project Area shortages, individual uses or activities associated with hotel, retail and/or CalTrain would generate localized parking shortages in all Alternatives.

These overall year 2000 Project Area parking deficits could be eliminated using the following methods:

- Allow use of vacant land for temporary surface parking lots.
- Increase the amount of parking required by ordinance for this area above the assumed parking supply rates in Table VI.E.25, p. VI.E.160, particularly for the office, train station and hotel uses.
- Increase the cost of parking to encourage further the use of alternatives to the private automobile, particularly for non-peak-period drivers.

For details concerning mitigations for the overall Project Area deficits identified above, see Mitigation, p. VI.E.207.

For the year 2000, this analysis accounts for supply provided and demand generated in the Project Area only. Cumulative parking demand from nearby areas such as Showplace

Square Area and South of Market generally could increase parking demand in the Project Area, if sufficient parking is not provided for activities in those areas. Future transit service between the Project Area and the rest of Downtown, especially for Alternatives A and B, could result in increased use of the Project Area as an intercept parking area. These cumulative effects could result in less on-street parking supply available for Project Area drivers, especially north of China Basin Channel. The extent of these cumulative parking effects is not quantified because of the uncertainty of future changes in parking supply in areas outside the Project Area. However, as the current supply of parking in those areas is almost fully utilized, spillover effects, particularly north of China Basin Channel, could be substantial in the absence of the provision of more parking supply.

Parking demand associated with small-scale retail uses in all Alternatives could be met adequately by provision of time-limited on-street parking in the vicinity of the retail shops; large-scale retail uses, or multi-business retail complexes would generate parking demand that should be accommodated off-street. The retail parking demand factor used in this EIR analysis is an average for typical San Francisco neighborhood strip retail uses, ranging from low-intensity uses that attract relatively few vehicle trips, to high-intensity uses such as fast food restaurants.

Parking impacts could also be associated with open space and recreation facilities. Parking demand generated by these facilities would depend on the type of activity occurring there. Generally, peak parking demand related to these uses occurs in the evenings after work, or on weekends, when there is likely to be available parking off-street as well as on-street. However, some all-day and short-term parking is likely to be needed.

Alternative A. With Alternative A, the shortage of about 150 spaces would be most acute north of China Basin Channel in the vicinity of the office uses and CalTrain Station, and around the hotel in the Banana Triangle area south of the channel. Parking shortages associated with passenger activity at the CalTrain terminal at Seventh and Channel Streets reflects the zero parking supply assumed in this analysis for the train station.

Some of the unmet demand would spill over into the proposed medium density residential area south of the channel. Approximately 90 curbside spaces in the proposed residential areas would be within a 1,500-foot walking distance of the hotel, office uses, and the CalTrain station. S/LI/RD uses would generate an off-street parking surplus. The competition for parking around the hotel site would result from the 0.4 off-street spaces per hotel room assumed in the analysis. This low rate is more appropriate for hotels located in the center of the Downtown, where transit services and other alternatives to private automobiles result in less parking demand than would be anticipated in Mission Bay./103/

Alternative B. A deficit of about 170 parking spaces is forecast for this Alternative. Much of this unmet demand, which would result from the CalTrain station and office uses, would spill over into the residential areas to the east of Owens Street, since all of the approximately 125 curbside spaces in this residential area would be within a 1,500-foot walking distance. As with Alternative A, localized parking shortages would be concentrated around the CalTrain terminal.

Alternative N. As a result of using the existing planning code parking supply rate of 2.0 spaces per thousand square feet of office floor area (twice the supply rate assumed for Alternatives A and B) and the greater amount of curbside parking available, this Alternative would be able to supply almost 900 spaces more than Project Area demand projected for the year 2000. No deficit is therefore expected, nor any spillover of parking demand to streets outside the Project Area.

Pedestrians and Bicycles

Pedestrian and bicycle activity in the Project Area would be expected to increase with all three Alternatives. Other than those increases in pedestrian activity at the CalTrain station that would result from growth in the Downtown & Vicinity, increases in pedestrian activity would be related directly to development of the Project Area. Increases in bicycle travel would be related to growth in employment in the Downtown & Vicinity, as well as development in the Project Area. Bicycling for commuting is expected to increase in direct relation to employment growth.

Pedestrian travel would occur in relation to the nature and intensity of land use on each block face in the Project Area. Each Alternative is expected to provide sidewalks, crosswalks, and other pedestrian and bicycle amenities as part of the street system. Specific sidewalk widths have not yet been established, but minimum sidewalk widths are recommended as possible mitigation (see p. VI.E.209).

The highest pedestrian volumes would occur at the CalTrain station, where persons would be transferring to or from the (adjacent) MUNI bus and Metro platforms. With Alternatives A and B, the CalTrain station would be at Seventh and Channel Streets, with the Metro station parallel to CalTrain between I-280 and Owens Street. Walkways depressed below the CalTrain tracks may connect the multiple CalTrain platforms to an at-grade concourse that would serve the Metro stop.

With Alternative N, the CalTrain station would remain at Fourth and Townsend Streets. Two scenarios for connecting with MUNI Metro were discussed in the I-280 Transfer Concept Program (TCP) EIR./104/ In both scenarios, the Metro line would be on the reconstructed King (Street) Boulevard west of Fourth Street, with either an at-grade sidewalk platform or an underground walkway to CalTrain. Neither of these I-280 TCP EIR Alternatives, nor Mission Bay Alternative A or B, provides for a direct platform-to-platform transfer.

Peak pedestrian flows at the CalTrain station would occur during morning and evening commute peaks. Operating conditions at Fourth and Townsend Streets are currently unimpeded during commute peaks. However, reconstruction of King Street Boulevard as a new major arterial that accesses I-280 would introduce more potential conflicts between pedestrians and vehicle traffic. Pedestrian routes would require special design to avoid those potential impacts.

Concentrations of pedestrians are also expected near MUNI Metro stations. Within Mission Bay, MUNI Metro stations, beside the one at the CalTrain station, would be at King Street west of Sixth Street and at King Street west of Fourth Street. Both of those stations would exist with Alternatives A and B, but only the MUNI Metro / CalTrain Station at Fourth and King Streets would exist with Alternative N. Pedestrian volumes would be lower and less peaked at MUNI Metro Stations than at the MUNI Metro / CalTrain station in Mission Bay.

With Alternative A, development of the residential and retail uses north of Alameda Street by 2000 would generate pedestrian activity in those blocks. Similarly, development of the office and retail uses north of Berry Street and east of Fourth Street would promote pedestrian activity in that area. With the CalTrain station moved to Seventh and Channel Streets, commuters would walk to adjacent land uses north and south of China Basin Channel. With Alternative B, residential and retail development by 2000 would generate pedestrian travel increases primarily north of Berry Street and west of Fifth

Street, and along Owens Street. The office, retail and residential uses in Alternatives A and B would generate pedestrian travel at a higher rate than either the existing land uses or Alternative N. Development anticipated with Alternative N by 2000 would generate slight increases in pedestrian travel along Third and Fourth Streets south of China Basin Channel. Pedestrians would experience unimpeded flow regimes along these streets, if sidewalk widths are designed properly. Minimum sidewalk width recommendations are addressed in Mitigation Measures, p. VI.E.209.

Bicycle travel conditions would be improved by the addition of signed bike routes in each Alternative. With Alternatives A and B, Owens Street would be extended across China Basin Channel, and would provide an additional cross-channel route for bicyclists. (However, Owens Street would not be a designated bicycle route.) All three Alternatives would add a bicycle route on 16th Street, while Alternatives A and B would also add a bicycle route on Berry Street. (For maps of future streets in the Project Area in 2000, see Figures VI.E.11-VI.E.13, pp. VI.E.141-VI.E.143.)

With all three Alternatives, bicycle travel to and from the Project Area for commuting purposes is expected, as is localized bicycle use within the Project Area. The residential and recreational land uses associated with Alternatives A and B would generate more bicycle travel than would the land uses permitted with Alternative N. Increases in commute cycling to and from other parts of the Downtown & Vicinity through the Project Area would also be expected, because of the flat terrain along potential bicycle routes within and near Mission Bay.

PROJECT AREA IMPACTS, BUILD-OUT/2020

Impacts described for the year 2020 are based on full development of the Mission Bay Alternatives. The impacts described are projected to occur with implementation of the land use and transportation components of the Alternatives presented in Chapter V. The EIR Alternatives and Approval Process, Table V.3, p. V.20.

Street Intersections

The concept of LOS (presented in the analysis of 1985 and 2000 conditions) is used to describe operating conditions at build-out and to compare future and current operating conditions for existing intersections. Table VI.E.26 presents the intersection LOS

TABLE VI.E.26: P.M. PEAK HOUR INTERSECTION LEVELS OF SERVICE, 1985, 2000 AND 2020

	1985		Alternative A					
			2000			2020		
	V/C/a/	LOS/b/	V/C/a/	LOS/b/	%/c/	V/C/a/	LOS/b/	%/c/
Existing Signalized Intersections in Project Area								
Third and Berry	0.98	E	0.62	B	10	0.73	C	15
Third and Fourth / Mission Rock	0.83	D	0.74	C	10	0.84	D	15
Third and Mariposa	0.74	C	0.78	C	10	0.92	E	15
Third and 16th	0.69	B	0.67	B	10	0.74	C	15
Fourth and Townsend	0.31	A	0.50	A	10	0.57	A	15
Fourth and Berry	0.63	B	0.45	A	25	0.52	A	35
Seventh and Townsend	0.52	A	0.67	B	10	0.77	C	15
New Signalized Intersections in Project Area								
Third and King	/d/		0.89	D	5	1.02	F	15
Third and Townsend	/e/		0.57	A	15	0.68	B	25
Fourth and King	/d/		0.85	D	10	0.97	E	10
Fifth and King	/d/		0.77	C	10	0.88	D	15
Fifth and Townsend	/e/		0.56	A	15	0.65	B	20
Fifth and Berry	/d/		0.30	A	45	0.36	A	55
Owens and Berry	/d/		0.29	A	50	0.39	A	65
Owens and Alameda	/f/		0.13	A	40	0.17	A	60
Longbridge and Alameda	/f/		0.06	A	100	0.12	A	100
Owens and Sixteenth	/f/		0.33	A	20	0.30	A	35
Center and Daggett	/f/							
Fourth and Hooper	/f/							
Sixth and King	/f/							
Iowa and Mariposa	/e/					0.70	B	25
Owens and Hooper	/f/							
Third and Yuma	/f/							
Third and Hooper	/f/							
Third and China Basin	/e/							
Sixth and Daggett	/f/							
Unsignalized Intersections in Project Area								
Seventh and 16th/Mississippi	/g/	D	0.52/h/	A	10	0.37/h/	A	10
Pennsylvania and Mariposa	/g/	D	0.78/h/	C	5	0.75/h/	C	5
Signalized Freeway Access Points								
First and Harrison (I-80 east on-ramp)	1.00/i/	F	1.27/j/	F	0	1.37/j/	F	0
Second and Bryant (Sterling St. HOV I-80 east on-ramp)	0.37	A	0.45	A	--	0.52	A	0
Second and Harrison (to I-80 east on-ramps)	0.79	C	0.98	E	5	1.13	F	5
Fourth and Harrison (I-80 west on-ramp)	0.69	B	0.92	E	5	1.01	F	5
Fourth and Bryant (I-80 east off-ramp)	0.36	A	0.53	A	5	0.58	A	10
Fifth and Bryant (I-80 east on-ramp)	1.00/i/	F	1.46/j/	F	5	1.59/j/	F	10
Fifth and Harrison (I-80 west off-ramp)	0.78	C	1.15	F	5	1.21	F	5
Sixth and Brannan (I-280 ramps)	1.00	F	0.92	E	0	0.99	E	0
Seventh and Harrison (I-80 west on-ramp)	0.60	B	0.74	C	5	0.79	C	5
Unsignalized Freeway Access Point								
Harrison and Essex (I-80 east on-ramp)	/i/	F	/i/	F	0	/i/	F	0

TABLE VI.E.26: P.M. PEAK HOUR INTERSECTION LEVELS OF SERVICE, 1985, 2000 AND 2020 (continued)

	Alternative B						Alternative N				
	2000			2020			2000			20	
	V/C/a/	LOS/b/	%/c/	V/C/a/	LOS/b/	%/c/	V/C/a/	LOS/b/	%/c/	V/C/a/	L
Existing Signalized Intersections in Project Area											
Third and Berry	0.64	B	5	0.68	B	5	0.62	B	5	0.71	
Third and Fourth / Mission Rock	0.68	B	5	0.81	D	10	0.73	C	5	0.79	
Third and Mariposa	0.70	B	5	0.84	D	5	0.72	C	5	0.73	
Third and 16th	0.64	B	5	0.70	B	10	0.63	B	5	0.73	
Fourth and Townsend	0.51	A	5	0.58	A	15	0.56	A	5	0.59	
Fourth and Berry	0.38	A	15	0.46	A	30	0.41	A	20	0.42	
Seventh and Townsend	0.72	C	10	0.87	D	10	0.74	C	5	0.83	
New Signalized Intersections in Project Area											
Third and King	0.89	D	5	0.98	E	5	0.92	E	5	1.04	
Third and Townsend	0.52	A	10	0.54	A	10	0.55	A	15	0.61	
Fourth and King	0.86	D	5	0.96	E	10	0.89	D	5	0.93	
Fifth and King	0.76	C	10	0.78	C	10	0.79	C	5	0.83	
Fifth and Townsend	0.56	A	15	0.62	B	15	0.54	A	10	0.55	
Fifth and Berry	0.25	A	40	0.24	A	35	0.18	A	30	0.23	
Owens and Berry	0.25	A	50	0.29	A	55					
Owens and Alameda	--	--	--	--	--	--	--	--	--	--	
Longbridge and Alameda	--	--	--	--	--	--	--	--	--	--	
Owens and Sixteenth	0.36	A	25	0.28	A	35	0.14	A	10	0.19	
Center and Daggett	0.10	A	100	0.10	A	100					
Fourth and Hooper	0.22	A	10	0.29	A	30					
Sixth and King							0.12	A	5	0.19	
Iowa and Mariposa				0.61	B	15				0.51	
Owens and Hooper				0.14	A	55					
Third and Yuma				0.66	B	10					
Third and Hooper				0.43	A	10					
Third and China Basin										0.41	
Sixth and Daggett										0.10	
Unsignalized Intersections in Project Area											
Seventh and 16th/Mississippi	0.55/h/	A	10	0.48/h/	A	15	0.38/h/	A	5	0.43/h/	
Pennsylvania and Mariposa	0.85/h/	D	5	0.86/h/	D	5	0.75/h/	C	5	0.81/h/	
Signalized Freeway Access Points											
First and Harrison (I-80 east on-ramp)	1.27/j/	F	0	1.37/j/	F	0	1.27/j/	F	0	1.39/j/	
Second and Bryant (Sterling St. HOV I-80 east on-ramp)	0.46	A	--	0.55	A	--	0.46	A	--	0.58	
Second and Harrison (to I-80 east on-ramps)	1.02	F	5	1.13	F	5	1.00	F	0	1.19	
Fourth and Harrison (I-80 west on-ramp)	0.92	E	0	1.01	F	5	0.90	D	0	0.97	
Fourth and Bryant (I-80 east off-ramp)	0.52	A	5	0.58	A	10	0.51	A	0	0.55	
Fifth and Bryant (I-80 east on-ramp)	1.51/j/	D	5	1.63/j/	F	5	1.44/j/	F	5	1.56/j/	
Fifth and Harrison (I-80 west off-ramp)	1.16	F	0	1.22	F	5	1.14	F	0	1.19	
Sixth and Brannan (I-280 ramps)	0.92	E	0	0.99	E	0	0.97	E	0	1.06	
Seventh and Harrison (I-80 west on-ramp)	0.74	C	0	0.78	C	0	0.74	C	0	0.80	
Unsignalized Freeway Access Point											
Harrison and Essex (I-80 east on-ramp)	/i/	F	0	/i/	F	0	/i/	F	0	/i/	

/a/ V/C stands for volume-to-capacity ratio.
/b/ LOS is Level of Service; see Appendix E for definitions.
/c/ Percent of total intersection volumes estimated to be originating in or destined to Mission Bay, rounded to nearest five percent
/d/ 1985 counts were not taken because King and Berry Streets currently provide only local access.
/e/ 1985 counts not taken because of low volumes at this "T" intersection.
/f/ 1985 counts were not taken because the intersection does not exist.
/g/ LOS calculated represents the worst movement level of service calculated for the intersection. For unsignalized intersections, calculated.
/h/ Intersection assumed to be signalized in future.
/i/ LOS F on the Bay Bridge approaches, not the ratio of volume-to-capacity.
/j/ Future V/C calculated based on saturated V/C calculated for 1985.

SOURCE: Barton-Aschman Associates, Inc.

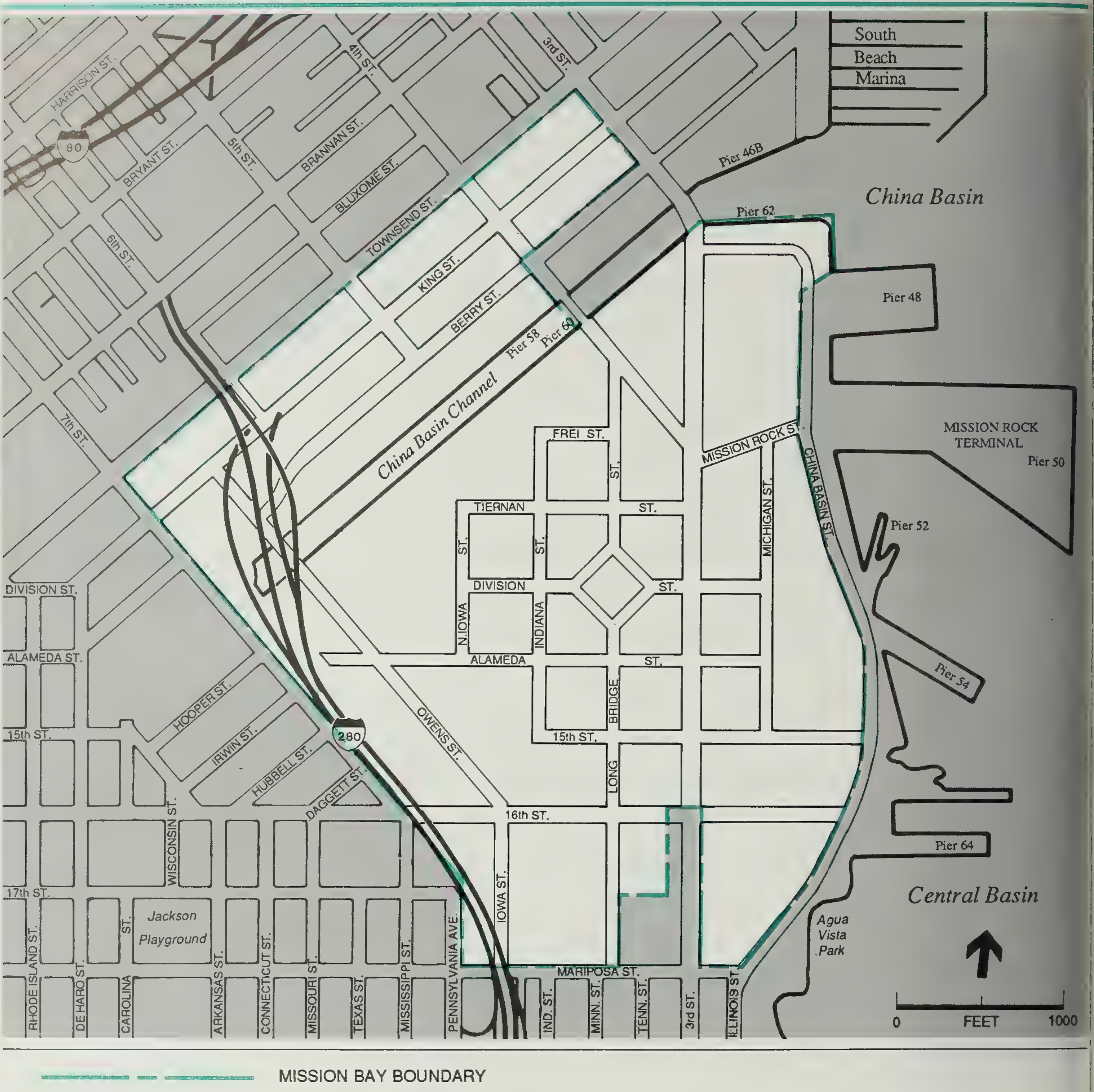
calculated for 1985 and projected for the year 2020. The percentages of total intersection approach volumes forecast to begin or end within the Project Area by Alternative are also shown in that table. The streets to be built by build-out of each Alternative are shown in Figures VI.E.16-VI.E.18.

The most substantial changes in intersection volumes between 1985 and 2020, independent of the Mission Bay Alternatives, would have occurred by 2000 as a result of changes in traffic patterns associated with 1) tearing down the I-280 freeway stub, and 2) replacing the off-ramp at Fourth and Berry Streets with new I-280 on- and off-ramps at Sixth and King Streets. The new King Boulevard connection to The Embarcadero, in combination with the new I-280 ramps, would serve traffic that would otherwise use the I-280 on-ramps at Sixth and Brannan Streets or at Mariposa Street. As no arterial streets would be developed between 2000 and 2020 (only neighborhood streets), the patterns of roadway usage and relationships between a.m. peak and p.m. peak traffic described earlier for the year 2000 on pp. VI.E.140-VI.E.148 would hold true for the year 2020.

Between 2000 and 2020, growth in traffic from Mission Bay and (primarily) the rest of the Downtown & Vicinity would cause LOS to degrade at most major intersections by one letter grade. At the following intersections, Levels of Service would degrade by two letter grades: with Alternatives A and B -- at Third and Mariposa Streets (from C to E or B to D, respectively), and with Alternative B -- at Third and Fourth / Mission Rock Streets (from B to D). Congestion levels generally are considered to become adverse when LOS drop below D. At that point, vehicle flows also interrupt transit circulation that shares street space, resulting in schedule delays and "bunching." (Bunching occurs when transit service on a route becomes unevenly distributed as buses fall behind schedule in reaching each stop within their prescribed intervals of time.)

At the following intersections, Levels of Service would not change between 2000 and 2020: Third and Mariposa Streets with Alternative N, Third and Townsend Streets with Alternative B, Fifth and Townsend Streets with Alternative N, Fifth and Berry Streets with all Alternatives, Owens and Berry Streets with Alternatives A and B, and most internal intersections serving the Project Area with all Alternatives.

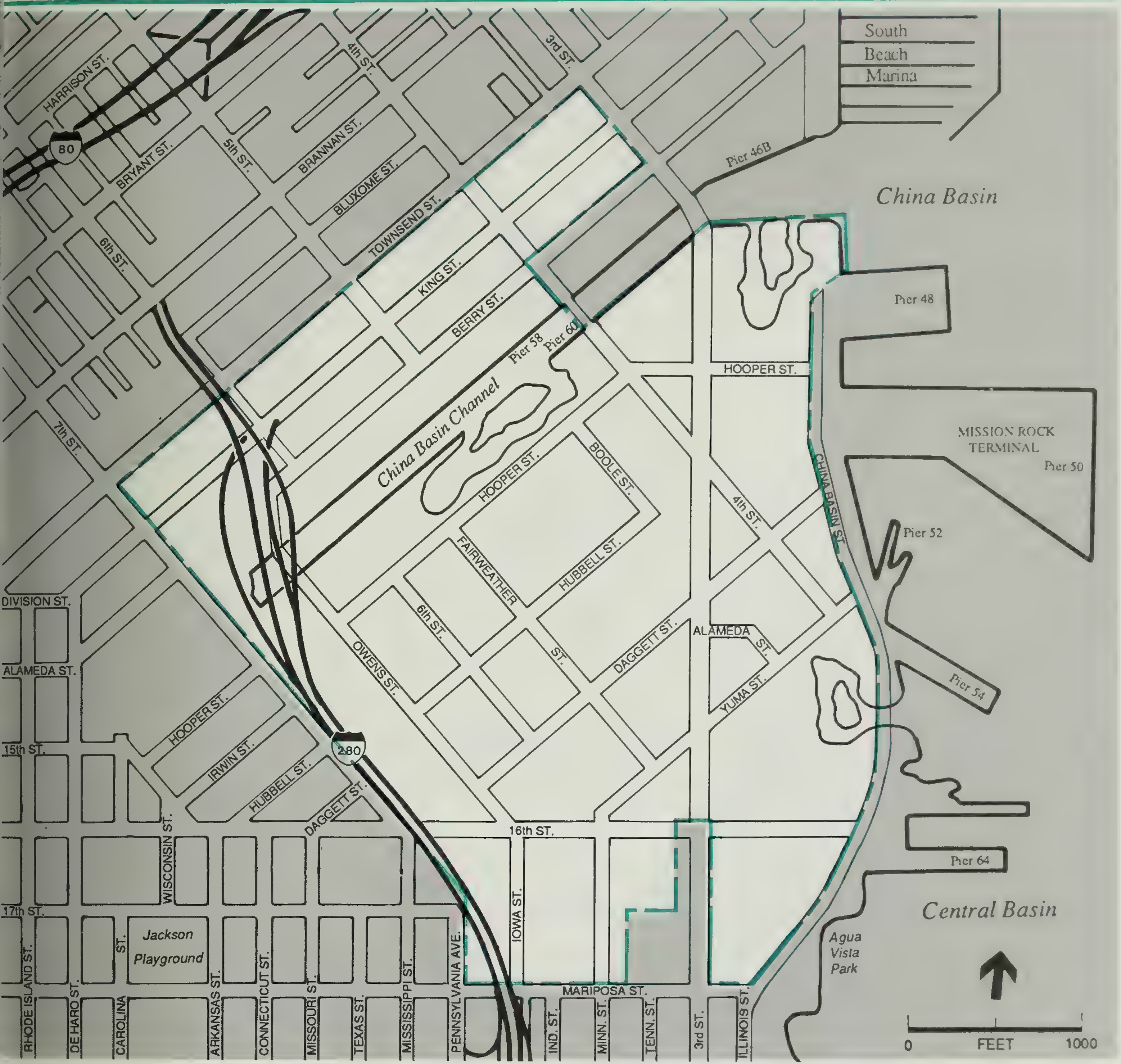
The differences in LOS projected among Alternatives are not significant for the year 2020, because the majority of vehicle trips passing through the intersections analyzed would come from the Downtown & Vicinity outside the Project Area. Traffic to or from Mission Bay would represent less than 35% (and typically 15 to 20%) of the total traffic at


South Beach Marina
China Basin
Central Basin
China Basin Channel
MISSION ROCK TERMINAL
Pier 46B
Pier 62
Pier 48
Pier 50
Pier 52
Pier 54
Pier 58
Pier 60
Pier 64
Agua Vista Park
HARRISON ST.
BRYANT ST.
80
4th ST.
3rd ST.
5th ST.
6th ST.
7th ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
FREI ST.
ST.
TIERNAN
ST.
ST.
ST.
DIVISION
ST.
N.IOWA
INDIANA
ALAMEDA
ST.
BRIDGE
15th ST.
LONG
16th ST.
MISSION ROCK ST.
MICHIGAN ST.
CHINA BASIN ST.
OWENS ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
17th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
280
WISCONSIN ST.
ST.
Jackson Playground
RHODE ISLAND ST.
DE HARO ST.
CAROLINA
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IOWA ST.
MARIPOSA ST.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000
MISSION BAY BOUNDARY

Mission Bay

FIGURE VI.E.1
ALTERNATIVE A PROJECT AREA STREETS -
BUILD-OUT / 202

SOURCE: Environmental Science Associates, Inc.

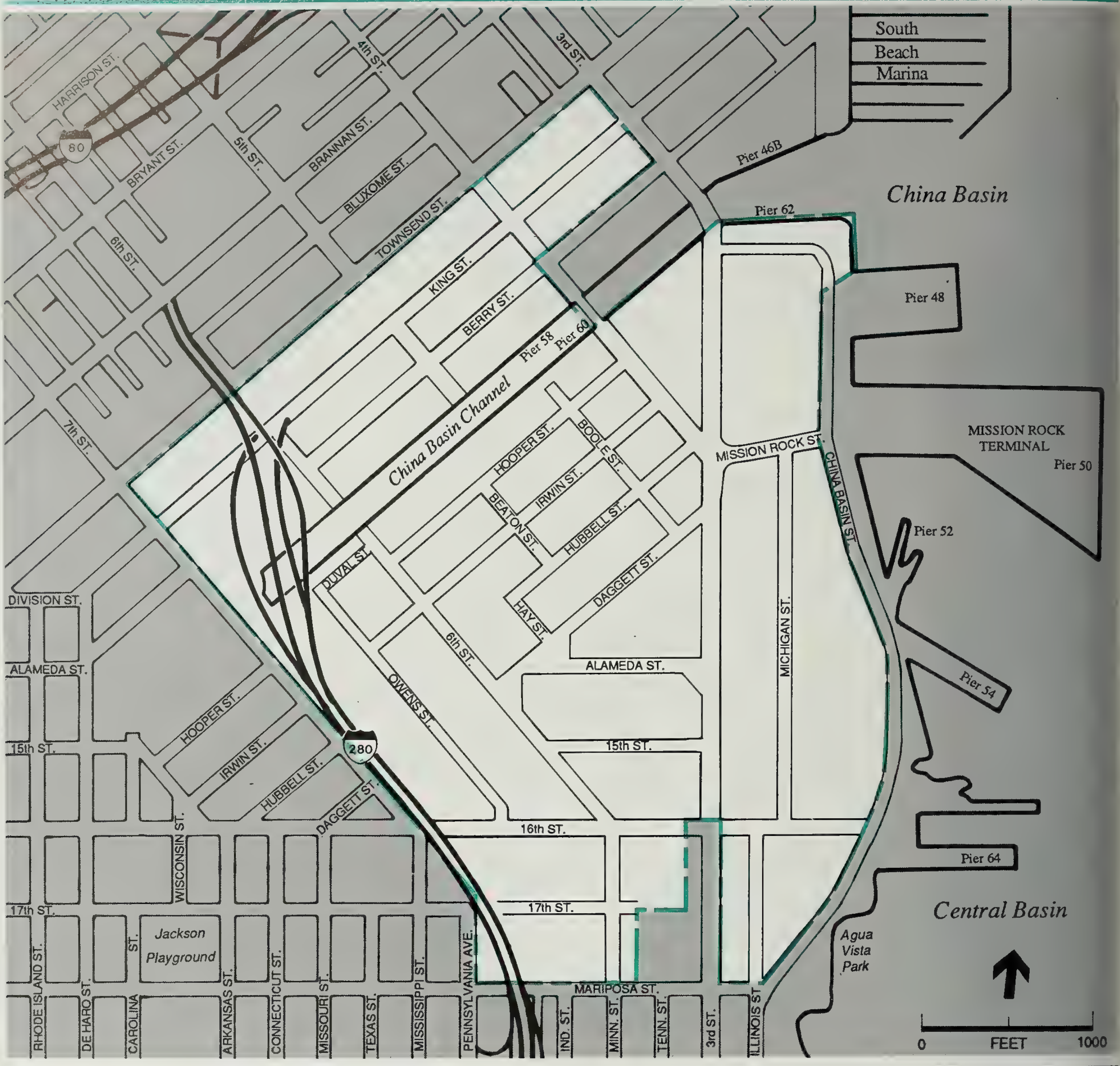

South Beach Marina
China Basin
Pier 46B
Pier 48
Pier 58
Pier 60
HARRISON ST.
BRYANT ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
4th ST.
3rd ST.
5th ST.
6th ST.
7th ST.
80
China Basin Channel
HOOPER ST.
BOOLE ST.
FAIRWEATHER ST.
HUBBELL ST.
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
CHINA BASIN ST.
DIVISION ST.
ALAMEDA ST.
ALAMEDA ST.
DAGGETT ST.
YUMA ST.
OWENS ST.
15th ST.
IRWIN ST.
280
16th ST.
17th ST.
Jackson Playground
WISCONSIN ST.
IOWA ST.
MARIPOSA ST.
Central Basin
Agua Vista Park
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000

MISSION BAY BOUNDARY

Mission Bay

FIGURE VI.E.17
ALTERNATIVE B PROJECT AREA STREETS – BUILD-OUT / 2020

SOURCE: Environmental Science Associates, Inc.


South Beach Marina
China Basin
Pier 46B
Pier 62
Pier 48
Pier 58
Pier 60
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
China Basin Channel
HARRISON ST.
80
BRYANT ST.
4th ST.
3rd ST.
5th ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
HOOPER ST.
BOOLE ST.
IRWIN ST.
BEATON ST.
HUBBELL ST.
DAGGETT ST.
HAY ST.
DUVAL ST.
6th ST.
OWENS ST.
MISSION ROCK ST.
CHINA BASIN ST.
MICHIGAN ST.
ALAMEDA ST.
15th ST.
16th ST.
17th ST.
MARIPOSA ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
17th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
280
WISCONSIN ST.
Jackson Playground
ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000

MISSION BAY BOUNDARY

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE VI.E.18
ALTERNATIVE N PROJECT AREA STREETS - BUILD-OUT / 2020

intersections of streets connecting the Project Area with other areas of San Francisco, and 10% or less of traffic at intersections serving as freeway access points. For some intersections, the minor differences among Alternatives would result from projected vehicle volumes that would exceed the mathematical boundary of a LOS in one Alternative (thus assigning the intersection to the next LOS), but not in another Alternative. Differences among Alternatives are too small to be considered statistically significant. In addition, the forecasts are for travel patterns in the distant future; when transportation capacity increases not assumed in this EIR analysis could cause additional shifts among travel modes.

For existing signalized intersections within the Project Area, Levels of Service would change as a result of the projected redistribution of p.m. peak traffic shares from the two existing I-280 on-ramps to the three future on-ramps (including Mariposa Street). That change, in combination with cumulative growth between 1985 and 2020 in travel to and from Mission Bay, the rest of the Downtown & Vicinity, and the rest of the region would have the following effects:

- LOS for the intersection of Third and Berry Streets would improve in 2020 from E in 1985 to C with Alternatives A and N, and B with Alternative B. At Fourth and Berry Streets, the LOS would improve from B to A with all Alternatives.

- LOS would be nearly constant between 1985 and 2020, remaining at D (a marginal C with Alternative N) for the intersection of Third / Fourth / Mission Rock Streets, and remaining at A at the intersection of Fourth and Townsend Streets.

- LOS at Third and Mariposa Streets would degrade from C in 1985 to E with Alternative A, to D with Alternative B, and would remain at C with Alternative N. LOS at Third and 16th Streets would degrade from B in 1985 to C with Alternatives A and N, and remain at B with Alternative B. LOS at Seventh and Townsend Streets would degrade from A in 1985 to C with Alternative A, and to D with Alternatives B and N.

- LOS for intersections along King Boulevard would be E-F at Third Street, E at Fourth Street, and C-D at Fifth Street. King Boulevard at Third Street would have the worst LOS of these three intersections because of the large numbers of vehicles from the northeastern and eastern sectors of downtown projected to turn left from westbound King Boulevard to southbound Third Street in combination with the eastbound through volumes along King Boulevard. At Fourth Street, a smaller number of vehicles is projected to turn left from westbound King Boulevard to southbound Fourth Street, partly because of the assumption that Third Street would contain more left-turn lanes than Fourth Street.

- All other intersections within the Project Area would be operating at LOS A or B, especially where the streets would be serving predominantly trips to or from the Project Area.

Those projections are based on the assumption that by 2000 travelers from the Downtown & Vicinity would substantially increase their use of transit and ridesharing during the p.m. peak period.

The intersections of Pennsylvania Avenue and Mariposa Street and of Seventh/ 16th / Mississippi Streets are assumed to be converted from stop-sign control to signal control as development of Mission Bay proceeds. Those changes, despite the projected increase in traffic headed toward I-280 and Potrero Hill around the western boundary of the Project Area, would cause the LOS at Pennsylvania Avenue and Mariposa Street to remain at D with Alternatives B and N and to improve to C with Alternative A, while LOS at Seventh / 16th / Mississippi Streets would improve from D to A with all Alternatives. Traffic around the western boundary of the Project Area would grow as some drivers would switch to less congested paths to reach the I-280 on-ramp at Mariposa Street, rather than the paths that would require them to travel on or across King Boulevard, once the intersections along the shortest distances between Downtown & Vicinity and I-280 become saturated with vehicles.

LOS F (describing severe congestion) is projected for almost all intersections serving as access points for traffic to or from the I-80 freeway, due to the projected increase in traffic from the Downtown & Vicinity, including Mission Bay. At First and Harrison Streets, Fifth and Bryant Streets, and Harrison and Essex Streets, the LOS would remain at F, and at Second and Bryant at A, but with a 33% to 40% higher volume-to-capacity ratio (depending on the Alternative). At Second and Harrison Streets, Fourth and Harrison Streets, and Fifth and Harrison Streets, the LOS would degrade from C in 1985 to F in 2020. At Seventh and Harrison Streets, the LOS would drop from B in 1985 to C-D. Mission Bay would account for typically 5% and no more than about 10% of the total vehicle volumes at freeway access points.

The intersection of Sixth and Brannan Streets would continue to operate at LOS E-F. Projected growth in travel between 1985 and 2020 would return the volume-to-capacity ratio to today's high level, even with reorientation of future traffic to the new I-280 ramps at Sixth and King Streets.

Comparison of the Project Area's share of total intersection volumes for each Alternative indicates that in the year 2020 Alternative A would contribute a somewhat higher share of total traffic than Alternatives B or N, and Alternative B would contribute a somewhat higher share of total traffic than Alternative N. Alternative A would contribute 5% to 15% to traffic volumes at six intersections whose 2020 LOS is forecast to be worse than D. Alternative B would contribute 5% to 10% to traffic volumes at six intersections with Levels of Service worse than D. Alternative N would contribute 5% to 10% to traffic volumes at three intersections with Levels of Service worse than D (see Table VI.E.26, pp. VI.E.167-VI.E.168.)

The primary impact of traffic generated in 2020 by the Project Area on major intersections in Nearby Areas would consist of diversion effects caused by increased peak hour delay at intersections where Project Area traffic would represent 10% or more of cumulative traffic, resulting in LOS E or worse. For Alternative A, three such intersections were identified: King Boulevard at Third and at Fourth Streets, and Third and Mariposa Streets. Congestion delay at those intersections may induce traffic diversion to the following streets: Townsend between Second and Seventh Streets, Berry between Owens and The Embarcadero, Owens between King and Mariposa, Iowa between 16th and Mariposa, Mariposa between Owens and Third, and Tennessee and Minnesota for a block south of Mariposa. Peak hour diversion to those streets as a result of Project Area traffic is not expected to be substantial. Much more significant would be diversion to those streets that would occur because cumulative traffic from the Downtown & Vicinity would increasingly shift from U.S. 101 and I-280 to surface streets to avoid severe congestion at the U.S.-101 / I-280 Interchange. Cumulative diversion would substantially degrade operating conditions at intersections not currently serving intra-city or inter-city traffic.

With Alternative B, the Project Area would contribute 10% or more to only one intersection whose LOS would be E or worse: Fourth and King Streets. Traffic diversion would affect fewer streets in or near the Project Area than would cumulative traffic with Alternative A, with Berry and Townsend Streets between Second and Seventh Streets perhaps being most affected by diverted traffic.

With Alternative N, Third and King Streets would be the only intersection where the Project Area would contribute 10% or more to an intersection whose LOS would be E or worse. Some traffic may be diverted from this intersection to Townsend between Second and Seventh Streets, Berry between Owens and The Embarcadero, Owens between King and Iowa, and Iowa between 16th and Mariposa to avoid congestion delay.

Transit

The same methodology described on pp. VI.E.148 and VI.E.149 to create the forecasts of year 2000 transit riders to and from the Project Area was used for the year 2020. In addition, the capacities assumed for each MUNI route for 2000 were assumed to remain the same for 2020, so that the projections of 2020 transit travel demand can be used to indicate the increases in capacity required between 2000 and 2020.

The projections of peak-direction p.m. peak riders on MUNI routes serving the Project Area are displayed in Table VI.E.27. They are related to the transit screenline forecasts presented in Tables VI.E.16 and VI.E.17, pp. VI.E.115-VI.E.118 and to the vehicular travel forecasts presented in Tables VI.E.14 and VI.E.15, pp. VI.E.106-VI.E.109. The riders assigned to MUNI lines are consistent with the forecasts of travel by mode at screenlines and of vehicular volumes at intersections.

As would be the case in 2000, the Project Area's contribution to peak volumes (at the maximum load point between Mission Bay and Market Street) would vary by route. At build-out, the Project Area would contribute approximately the following percentages of maximum p.m. peak-period volumes measured South of Market Street: -- 50% to the MUNI Metro with Alternative B, -- 40% to the 47-VAN NESS with Alternative B, -- 33% to the MUNI Metro with Alternative A and to the 15-THIRD with Alternative B, -- 25% to the 15-THIRD with Alternative A and to the E-EMBARCADERO with Alternative B, -- 20% to the 30-STOCKTON with Alternative B, -- 10% to the 22-FILLMORE with Alternatives A and B, and 5% or less to the 81X-BATTERY-SANSOME EXPRESS and to all routes with Alternative N. The remaining ridership at the maximum load point for each line would be contributed by transfers to CalTrain and by riders boarding and alighting outside the Project Area.

The MUNI Metro line would operate at LOS B-C with Alternative N during the peak period and peak hour, respectively. However, the additional riders headed toward the CalTrain station and the residential areas of Mission Bay with Alternatives A and B would degrade the LOS to D during the peak period. During the peak hour, the LOS on the Metro would be D with Alternative A, but E with Alternative B.

The 30-STOCKTON, 22-FILLMORE and 81X-BATTERY-SANSOME EXPRESS would operate at LOS D and E depending on the Alternative and time period. In the p.m. peak period, the 30-STOCKTON would operate at LOS D with Alternatives A and N, but E with Alternative B, as that Alternative would have the highest number of residents in the Project Area and thus generate more southbound p.m. period trips. The 22-FILLMORE would operate at LOS D during the peak period and E during the peak hour, basically with no discernible difference between Alternatives A and B. The 81X-BATTERY-SANSOME

TABLE VI.E.27: CUMULATIVE DEMAND AND CAPACITY FOR MUNI ROUTES SERVING THE PROJECT AREA, 2020

Route			Capacity/a/	Alternative A			Alternative B			Alternative N		
				Demand	D/C/b/	LOS/c/	Demand	D/C/b/	LOS/c/	Demand	D/C/b/	LOS/c/
				PEAK PERIOD								
15	--	THIRD	1,960	2,825	1.44	E	2,975	1.52	F	2,700	1.38	E
22	--	FILLMORE	855	1,050	1.23	D	1,050	1.23	D	/d/	--	--
30	--	STOCKTON	2,925	3,625	1.24	D	3,875	1.32	E	3,025	1.03	D
		METRO	4,760	4,825	1.01	D	5,850	1.23	D	3,100	0.65	B
42	--	DOWNTOWN LOOP	855	/d/	--	--	/d/	--	--	1,100	1.29	E
47	--	VAN NESS	855	1,775	2.08	F	2,100	2.46	F	/d/	--	--
76	--	MARIN HEADLANDS	Sunday Service Only									
81X	--	BATTERY-SANSOME EXPRESS	630	775	1.23	D	775	1.23	D	725	1.15	D
				PEAK HOUR								
15	--	THIRD	1,125	1,640	1.46	E	1,725	1.53	F	1,575	1.40	E
22	--	FILLMORE	460	600	1.30	E	600	1.30	E	/d/	--	--
30	--	STOCKTON	1,700	2,100	1.24	D	2,250	1.32	E	1,750	1.03	D
		METRO	2,400	2,800	1.17	D	3,530	1.40	E	1,825	0.76	C
42	--	DOWNTOWN LOOP	460	/d/	--	--	/d/	--	--	650	1.41	E
47	--	VAN NESS	460	1,025	2.23	F	1,225	2.66	F	/d/	--	--
76	--	MARIN HEADLANDS	Sunday Service Only									
81X	--	BATTERY-SANSOME EXPRESS	315	450	1.43	E	450	1.43	E	425	1.35	E

/a/ The unit of seats has been used to define capacity.
/b/ Demand-to-capacity ratio (D/C) equals passengers per seat.
/c/ Level of Service, as defined in Transportation Research Board *Circular 212*; See Appendix E for details.
/d/ This route would not be operated in the Project Area under this Alternative.

SOURCE: Barton-Aschman Associates, Inc.

EXPRESS would operate at LOS D during the peak period and E during the peak hour, with no difference among Alternatives, as this line's ridership would be affected primarily by CalTrain ridership and secondarily by residents of the Project Area with Alternatives A and B or the availability of the 42-DOWNTOWN LOOP in Alternative N.

The most severe overcrowding is projected for the 47-VAN NESS, with this route projected to operate at LOS F throughout the peak period. With the transit network associated with Alternatives A and B, the 47-VAN NESS would provide the most direct connection between Mission Bay and 1) the Civic Center - Van Ness area, as well as 2) the Van Ness MUNI Metro Station, and 3) MUNI lines serving northwest San Francisco.

As described for the year 2000 conditions, the definition of capacity provided on each MUNI line would be greater with application of MUNI's load factor (which accounts for more standees) than the LOS D standard used here. That change in capacity would occur, not by scheduling more vehicles into service, but by assuming, as does MUNI, that more than about 25% of peak-period passengers will have to stand before a service change is required.

An estimate of the additional capacity required between 2000 and 2020 for LOS on MUNI routes or lines serving the Project Area to remain at the service levels projected for 2000 is presented in Table VI.E.28. If MUNI actually provided the increases in capacity shown in Table VI.E.28, MUNI routes serving the Project Area would be operating at LOS D or better, except for the 47-VAN NESS and 81X-BATTERY SANSOME EXPRESS. Those increases in capacity could be achieved by scheduling more bus trips, except for the very large increases required for the 47-VAN NESS. To relieve demand on the 47-VAN NESS between the Civic Center / Van Ness area and the Project Area, and to provide additional north-south capacity on the 30-STOCKTON and 15-THIRD, would require the capacity of a larger number of articulated buses operating on city streets than assumed, or a new MUNI Metro line between the Project Area and the Civic Center / South Van Ness area (see Mitigation, p. VI.E.220).

Rail Freight Facilities

Alternatives A and B

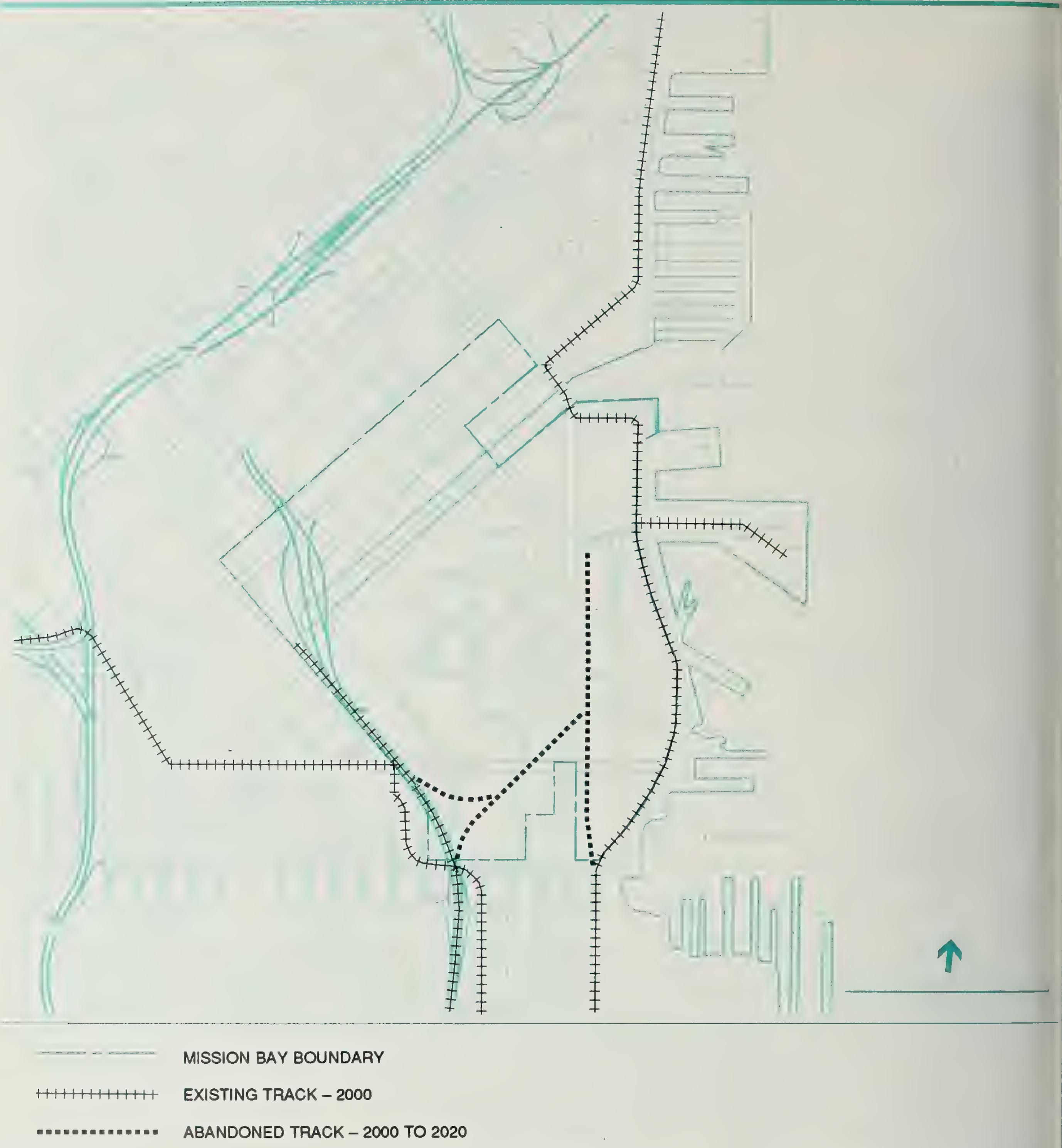
Build-out of Alternatives A and B would affect rail freight facilities and services in the Project Area or vicinity beyond those impacts identified for the year 2000 on

TABLE VI.E.28: PERCENTAGE INCREASES IN CAPACITY REQUIRED FOR 2020 LEVEL OF SERVICE TO BE SIMILAR TO THAT IN 2000

Muni Route	Peak Hour			Peak Period		
	Alternative A	Alternative B	Alternative N	Alternative A	Alternative B	Alternative N
15 -- THIRD	25 /a/	32 /a/	13 /a/	25 /a/	32 /a/	13 /a/
22 -- FILLMORE	8 /a/	8 /a/	--	14 /a/	14 /a/	--
30 -- STOCKTON	23 /a/	28 /a/	30 /b/	22	28	30 /b/
METRO	40 /b/	58 /b/	20 /c/	41 /c/	61 /c/	18 /c/
42 -- DOWNTOWN LOOP	--	--	13 /a/	--	--	10 /a/
47 -- VAN NESS	41 /d/	63 /d/	--	42 /e/	62 /d/	--
81X -- BATTERY-SANSOME EXPRESS	13 /e/	13 /e/	22 /a/	11 /a/	11 /a/	21 /b/

/a/ This line would be operating at Level of Service D.
/b/ This line would be operating at Level of Service C.
/c/ This line would be operating at Level of Service B.
/d/ This line would be operating at Level of Service F.
/e/ This line would be operating at Level of Service E.

SOURCE: Barton-Aschman Associates, Inc.


MISSION BAY BOUNDARY
EXISTING TRACK – 2000
ABANDONED TRACK – 2000 TO 2020

NOTES: The Indiana Street line (one block east of I-280) joins the Illinois Street line (one block east of Third Street) near 25th Street and continues south to serve the Port of San Francisco.

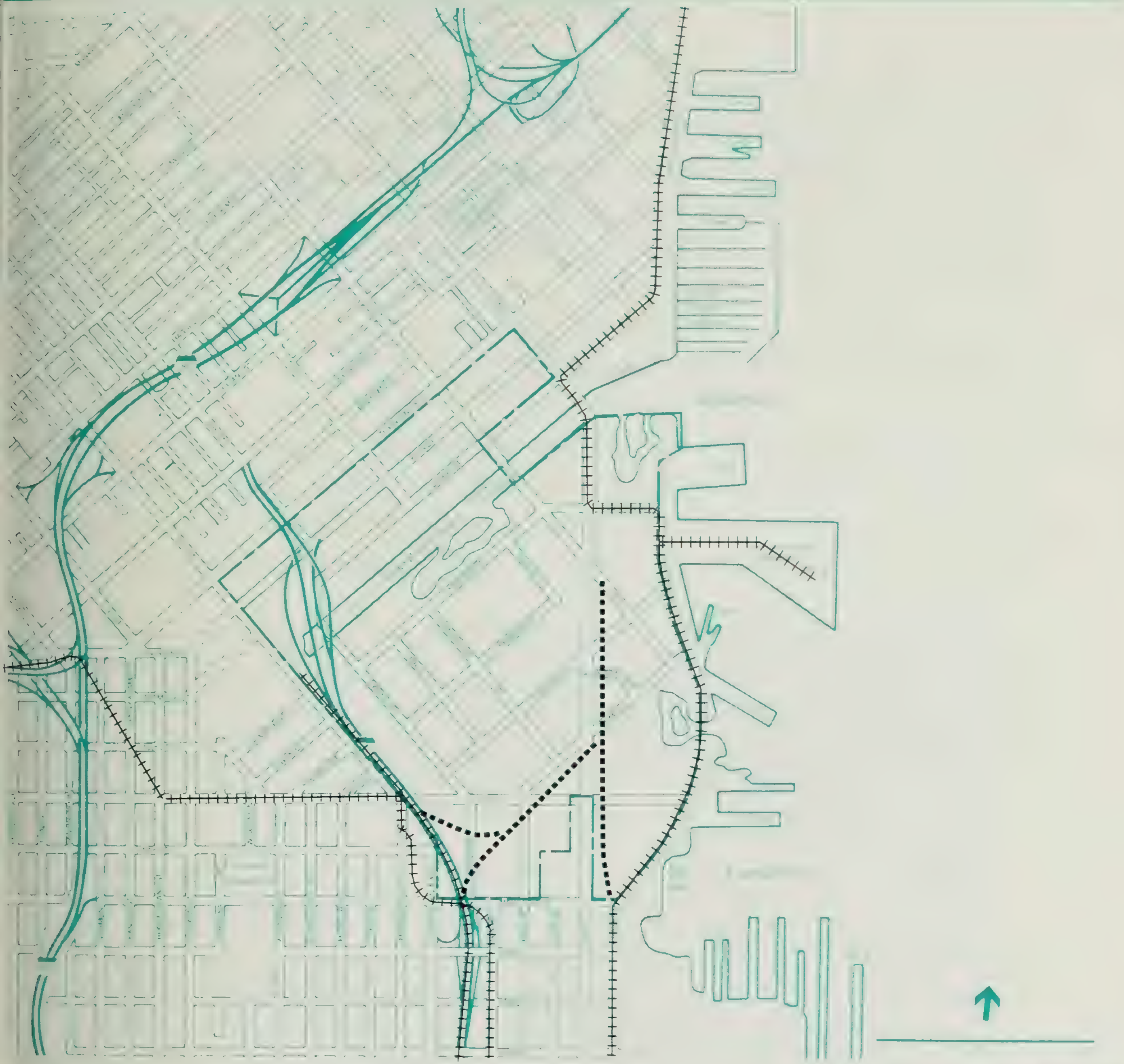
The line west of Division Street splits to follow Florida Street south to 18th Street and Harrison Street south to 23rd Street.

The Embarcadero line continues to the Northeast Waterfront.

Mission Bay

FIGURE VI.E.1
ALTERNATIVE A RAIL TRACKAGE
BUILD-OUT / 202

SOURCE: Barton-Aschman Associates, Inc.



——— — — ——— MISSION BAY BOUNDARY

+++++++++++++ EXISTING TRACK – 2000

▪▪▪▪▪▪▪▪▪▪▪▪▪▪ ABANDONED TRACK – 2000 TO 2020

NOTES: The Indiana Street line (one block east of I-280) joins the Illinois Street line (one block east of Third Street) near 25th Street and continues south to serve the Port of San Francisco.

The line west of Division Street splits to follow Florida Street south to 18th Street and Harrison Street south to 23rd Street.

The Embarcadero line continues to the Northeast Waterfront.

FIGURE VI.E.20
ALTERNATIVE B RAIL TRACKAGE – BUILD-OUT / 2020

SOURCE: Barton-Aschman Associates, Inc.

pp. VI.E.153-VI.E.156. Alternatives A and B include land uses that would replace the existing rail line connection to the North Container Terminal. Those uses include residential development in Alternative A, and two wetlands areas and open space in Alternative B. The wetlands would occupy the right-of-way of both the existing rail connection to the Northern Container Terminal and the proposed rail connection to San Francisco's Northern Waterfront. Build-out of Alternatives A and B also includes residential development on existing rail rights-of-way in the vicinity of 16th Street between the mainline and China Basin Street.

To accommodate those proposed land use developments, changes to rail lines in the Project Area are proposed during the build-out period and are shown in Figures VI.E.19 and VI.E.20. The following changes would continue rail freight service to the Northern Waterfront and to the Northern Container Terminal with Alternatives A and B:

- Belt Railroad: Embarcadero / North Point Sector. With Alternative A, access would be provided by use of the Indiana Street line to connect to the Illinois Street line south of the Project Area, then use of the Illinois Street line north to China Basin Street in the Project Area, and north to the Third Street Bridge. There, existing and reconditioned tracks on Third and Berry Streets would connect to the existing Belt Line track on Berry Street. Figures VI.E.5 and VI.E.6, pp. VI.E.21 and VI.E.23, show the connection between the SP mainline and the ATSF Indiana Street line via the WP/SP lead extending west on 16th Street (see also Figures VI.E.19 and VI.E.20). For Alternative B, the mainline / Indiana Street line connection would be the same as for Alternative A; however, the route through the Project Area would be slightly different. Tracks in the Project Area would run along China Basin Street over a new bridge provided across the wetlands area near Pier 54, west on the new Hooper Street to Third Street, and north across the Lefty O'Doul Bridge, to the existing Berry Street tracks. With Alternative B, construction of two blocks of industrial track in the roadway of Hooper and Third Streets would be required. Turns of relatively short radius would limit freight cars to 60-foot lengths, a limitation imposed in any case by the turn north of the Lefty O'Doul Bridge. The low freight-car volume on this line (one railcar a week or less) would not substantially affect vehicular traffic on the streets, if the trains were operated during off-peak hours or at night.

- North Container Terminal Service. By build-out, residential land uses would eliminate the existing 16th Street connection to Illinois Street, which provides access to the Port's North Container Terminal at Islais Creek. In the absence of other rail connections to this terminal, the existing Indiana Street line would have to be used, south to Illinois Street and thence to the terminal. However, as the Indiana Street line is longer and crosses several more streets than the present rail freight route to the Port, additional travel time would be incurred. The Indiana Street track's alignment is adequate for the 89-foot freight cars currently serving the Port.

As noted earlier, the Port is studying the feasibility of providing more direct rail service to the North Container Terminal from the mainline, either from the mainline just south of

Army Street via the old WP tracks, or from existing tracks serving the South Terminal via a bridge over Islais Creek. However, as funding for that connection is not secured, preservation of the Indiana Street line outside the Project Area would be required for both Alternatives A and B.

Alternative N

All rail freight facilities and services assumed with Alternative N in the year 2000 would be assumed to continue to 2020. The existing trackage and yards described on p. VI.E.20–VI.E.25, could continue to exist with Alternative N land uses because of 1) their compatibility with rail-freight activities and 2) their potential use of rail-freight service.

Maritime Facilities and Services

The land use and employment forecasts presented in VI.B. Land Use, Business Activity, and Employment, pp. VI.B.67, VI.B.76, VI.B.101–VI.B.104, and VI.B.115–VI.B.117, provide the basis for this description of the transportation functions of piers and backlands at build-out of the Project Area. No major increase in maritime and related business activity in the Project Area and east of China Basin Street is expected.

Alternative A

Maritime uses of Piers 48, 50, and 54 would be compatible with uses proposed for the Project Area at build-out of Alternative A, although users of the piers would have less backland available for parking, storage and freight handling operations in the immediate vicinity. Activities requiring extensive nearby space for those purposes could no longer use Piers 48 to 54, and as a result, the mix of activities at those three piers would change. Maritime-related truck and rail freight volumes in the Project Area would decrease from their 1985 levels, with those decreases offset by truck and rail traffic generated by industrial uses.

Alternative B

Build-out of Alternative B would result in effects on existing maritime-related uses similar to those with Alternative A. Since there is no land area devoted to Port-related use in Alternative B, there would be no available backlands to serve maritime uses on the adjacent piers. As a result, those activities would not likely continue in 2020, as described in VI.B. Land Use, Business Activity, and Employment Impacts, p. VI.B.117.

Accordingly, maritime-related truck and rail freight volumes would decrease from the 1985 and 1987 levels described in Setting, p. VI.E.19 and VI.E.20, as with Alternative A. (For an analysis of a land use program that would retain Port-related uses east of Third, see VII. Variations on Alternatives, p. VII.10.)

Alternative N

All maritime facilities and services assumed present in the year 2000 are also assumed for 2020 with Alternative N. The area east of Third Street would be reserved for a future new container terminal assumed to be built after 2020. Therefore, maritime-related truck-traffic and rail freight volumes with Alternative N in 2020 would be similar to those in 1985 and 2000.

Parking

Supply and Demand Rates

The parking supply rates and demand ratios used for 2020 are the same as those used for the year 2000. Build-out would result in additional supply of off-street parking spaces in proportion to the amount of additional floor area built for each use. In addition, the supply of curb parking spaces would increase as streets would be extended and new streets built. The same limitations on the availability of curbside spaces for parking demand generated by non-residential uses was used for the 2020 analysis as for the 2000 analysis. For Alternative A, the total curbside spaces in residential blocks would be about 610, and for Alternative B, about 780 spaces. Excluding these residential block spaces, 700 curbside spaces would be available for parking demand generated by non-residential uses in Alternative A, 400 in Alternative B, and 2,100 in Alternative N. Table VI.E.29 summarizes the parking supply rates and the resulting amounts of parking that would result under each Alternative at build-out.

The comparison of parking demand and supply projected for 2020 indicates that there would be a parking deficit for the Project Area in Alternatives A (990 spaces) and B (290 spaces), and a relatively large parking surplus in Alternative N (2820 spaces). The amounts are shown in Table VI.E.29. These calculations take into account the use of on-street spaces in the Project Area./102/ Apart from the overall Project Area shortages, activities associated with office, hotel and retail development, and the CalTrain station would generate localized parking shortages in all Alternatives, as was the case for the year 2000.

TABLE VI.E.29: PROJECTED OFF-STREET PARKING DEMAND AND SUPPLY, 2020

	Alternative A					Alternative B			Alternative N			
Land Use	Supply Rates	Demand Rates/a/	Supply/b/	Demand/c/	(Shortage) or Surplus	Supply/d/	Demand	(Shortage) or Surplus	Supply Rates	Supply	Demand	(Shortage) or Surplus
NEW												
Office	1/1,000 s.f.	1.35	4,100	5,517	(1,417)	1,000	1,346	(346)	2/1,000 s.f.	2,000	1,346	654
S/LI/R&D	1/1,000 s.f.	0.9	3,600	3,272	328	420	382	38	N/A	0	0	0
M-2 Industrial	1/1,000 s.f.	0.9	0	0	0	0	0	0	0.67/1,000 s.f.	5,000	4,598	402
Port-Related M-2	0.67/1,000 s.f.	0.63	0	0	0	0	0	0	0.67/1,000 s.f.	702	655	47
Retail	1/1,000 s.f.	1.57	250	379	(129)	300	455	(155)	1/1,000 s.f.	100	152	(52)
Hotel	0.4/hotel room	0.84	200	420	(220)	0	0	0	N/A	0	0	0
Community Facilities	1/1,000 s.f.	1.00	125	125	0	293	293	0	0.67/1,000 s.f.	28	42	(14)
Train Station/e/	N/A	0.04	0	248	(248)	0	230	(230)	0	0	316	(316)
Housing/f/	1/D.U.	1.00	7,755	7,755	0	10,040	10,040	0	N/A	55	55	0
Subtotal, all uses			16,030	17,716	(1,686)	11,053	12,746	(693)		7,885	7,164	721
On-Street Parking/g/					700			400				2,100
NET TOTAL					(986)			(293)				2,821

/a/ Per 1,000 square feet of floor area, dwelling unit, or hotel room except for the train station, which is per daily boardings. See Appendix E. p. XIV.E.29 for details.
/b/ Supply is for building areas in Chapter V. The EIR Alternatives and Approval Process, using above supply rates.
/c/ Demand based upon parking demand ratios developed by Barton-Aschman Associates, Inc. (See Appendix E, Table XIV.E.8, p. VI.E.31), and building areas described in V. The EIR Alternatives and Approval Process.
/d/ Supply ratio same as for Alternative A.
/e/ Estimate of parking demand based on CalTrain survey data.
/f/ Includes houseboats and pleasure boat berths. Demand rate of one space per unit based on comparable San Francisco housing surveys.
/g/ On-street parking spaces are defined as within 1,500 feet of non-residential uses, excluding curb spaces on residential streets. See impacts text for full description of on-street parking spaces.

SOURCE: Barton-Aschman Associates, Inc.

As for the year 2000, these overall year 2020 Project Area deficits could be reduced or eliminated with the following methods:

- Increase the amount of parking required by ordinance for this project above the "parking supply rates" in Table VI.E.29 for the CalTrain Station, hotel, and office uses.
- Increase the cost of parking to encourage further use of alternatives to the private automobile, particularly for non-peak-period drivers.

For the year 2020, as for the year 2000, this analysis accounts for supply provided and demand generated in the Project Area only. Cumulative parking demand from nearby areas such as the Showplace Square Area and South of Market could add to parking demand in the Project Area if sufficient parking is not provided for activities in those areas. Future transit service between the Project Area and the rest of Downtown, especially for Alternatives A and B, could continue to make the Project Area an attractive intercept parking area for commuters working in parts of the Downtown & Vicinity other than Mission Bay. These cumulative effects could therefore result in less available on-street parking supply to meet Project Area demand, especially near the CalTrain station and north of China Basin Channel. However, the extent of these year 2020 cumulative parking effects was not quantified due to the uncertainty of parking demand and supply in areas outside the Project Area for such a distant timeframe. This competition for use of off-street (or on-street) parking is not projected for Alternative N, which would result in a parking supply surplus at build-out. For details concerning mitigations for the overall Project Area deficits identified above, see Mitigation, p. VI.E.222.

Alternative A. Since Project Area parking demand generated at build-out is greater than forecast supply, a shortage of 990 parking spaces would result from build-out of this Alternative, despite the availability of approximately 700 curbside parking spaces on existing and new streets in the Project Area for non-residential parking (see Table VI.E.29). S/LI/RD uses would produce an off-street parking surplus that could be utilized by other drivers if shared parking arrangements are implemented. With Alternative A, the shortage would be most acute north of China Basin Channel in the vicinity of the office uses proposed there. All 610 available curbside spaces in residential areas would be within a 1,500-foot walk distance of the CalTrain station, retail, office, or hotel uses in Alternative A. Given the estimated parking demand, spillover parking from those non-residential uses would be severe, and could not be adequately met even by the supply of residential curbside spaces.

Alternative B. A deficit of about 290 parking spaces is forecast for this Alternative. Some of the deficit would result in spillover parking into the Project Area residential streets, since approximately 525 spaces on these streets are within a 1,500-foot walking distance of the proposed office and retail uses and the CalTrain station. As with Alternative A, localized parking shortages would be concentrated around office uses on Owens Street and the CalTrain terminal.

Alternative N. As a result of the 2.0 spaces per thousand square feet of office floor area (twice the supply rate assumed for Alternatives A and B), and the much greater availability of on-street parking in this Alternative, development by year 2020 would be able to supply approximately 2,820 spaces more than the expected Project Area demand, if built with the proposed parking supply ratios. No spillover of parking demand to streets outside the Project Area is therefore anticipated.

Pedestrians and Bicycles

In 2020, the Alternatives would generate pedestrian and bicycle activity related to the nature and intensity of land use in the Project Area. With Alternative A, in addition to the activity at the CalTrain and MUNI Metro stations, the highest pedestrian volumes would be expected along the retail spine on Long Bridge Street. The office sector north of Berry Street would experience moderate to high volumes of pedestrians during commute peaks and noon hours. In Alternative B in 2020, pedestrian activity, other than at the CalTrain and MUNI Metro Stations, would be concentrated along Daggett Street. In Alternative N, in 2020, low pedestrian activity would be expected throughout the Project Area, with possible concentrations along King Street at the CalTrain and MUNI Metro stations.

Pedestrian activity would increase between 2000 and 2020, with the progressive development of the entire Project Area. The streets bordered by retail uses and any other streets connecting office and high-density residential uses with the CalTrain and MUNI Metro stations would be the streets most heavily used by pedestrians. Pedestrians would experience unimpeded flow regimes along these streets, if sidewalk widths are designed properly. Recommendations for minimum sidewalk widths are included in the discussion of mitigation measures, p. VI.E.209.

Bicycle travel conditions would change between 2000 and 2020 because of additional vehicle travel on streets within the Project Area. Bicycle routes and the major purposes for bicycle travel to or through the Project Area would not change between 2000 and 2020.

Construction Traffic

Construction of the land uses proposed in Alternatives A, B, and N would generate increases in truck and auto travel to and from the Project Area. Additional truck travel would be associated with removal and redistribution of excavation spoils and delivery of construction materials. An associated increase in auto travel from construction workers would also occur. Because of the long-term time frame for build-out of the Project Area and the master plan level of detail (i.e., specific building envelopes or sites have not been identified), projection of the quantity and nature of transportation effects from construction traffic at a refined level of detail is not feasible. However, several general issues related to project staging and overall effects can be discussed at this time.

The intensity and scale of truck travel would depend upon the amount of construction occurring at a given time, as construction of the project would occur in a more or less continuous fashion over time. The staging of the project would affect both the location and intensity of construction traffic. Construction north of China Basin Channel would not be expected to have much effect on the portion of the Project Area south of the channel (other than on major thoroughfares such as Third Street), unless excavation spoils from the northern portion were used as fill or surcharge on the southern portion (see VI.K. Geology and Seismicity, p. VI.K.21). Primary effects of truck traffic would be a lessening of the capacities of access streets and haul routes because of the slower movements and larger turning radii of trucks.

Intermittent lane blockage on Project Area streets could occur from queued trucks, which would temporarily reduce the carrying capacity of the affected streets. Primary haul and access routes in San Francisco would be Third Street and Army Street to or from the South Bay via the Bayshore Freeway. For the Project Area, trucks would use Third and Mariposa Streets to access I-280. Some shipments of materials arriving from the East Bay would be expected to use the Fifth Street and Fourth Street ramps to reach the Project Area. Temporary parking demand from vehicles used by construction workers, and impact on local intersections from construction worker traffic, would occur in proportion to the number of construction workers who would use automobiles to reach their work sites.

Overlapping of excavation and construction activities among sites within one phase and/or among phases of the project would magnify the construction traffic effects of an individual site or phase. With Alternative A, there would be relatively few people on-site when the first phase of construction begins; consequently, relatively few people would be exposed to the most substantial effects of excavation haul traffic. During following phases of construction, portions of the commercial, industrial, and residential uses of the project would be completed and most likely occupied. Consequently, construction traffic would affect an increasingly greater number of people during latter phases of development, especially in the residential portions of the Project Area, where excavation and construction would occur adjacent to completed residential units.

With Alternative B, similar conditions would exist, except that there would be more residential development than with Alternative A. Thus, with Alternative B, a greater number of residents would potentially be exposed to the effects of (later) project construction.

With Alternative N, no new residential development is proposed. However, houseboat residents would be exposed to construction effects. The overlapping effects of construction traffic could be more localized in Alternative N, as a less-structured pattern of development (i.e., no definite phasing of construction) would be expected than with Alternatives A or B.

Off-Street Freight Loading

Freight loading and service vehicles would generate temporary demand for off-street parking in the Project Area. Analysis of data published in Center City Circulation Program: Pedestrian Circulation and Goods Movement indicates that the land uses in the Project Area would generate the following demands for off-street spaces:/105/

	Spaces Per 1,000 Square Feet
Office	0.010
Retail	0.014
S/LI/RD	0.024
Residential	0.001
Hotel	0.004

Determination of a gross number of spaces of demand by Alternative would not be meaningful, as loading areas need to be determined on the basis of individual building designs and land-use mixes. The conceptual nature of the Alternatives precludes such analysis, as well as determination of spaces required under the Planning Code, as those requirements are keyed to the sizes of individual projects. If loading space is not provided at the above rates, excess off-street demand would be created on a localized basis and could either be served by on-street (curbside) loading zones or would cause temporary lane blockage on adjacent streets. If severe parking shortages were to occur for private vehicles, those vehicles would tend to abuse the designation of curbside loading zones for trucks. Interruptions in traffic flow would result from trucks then occupying travel lanes as loading zones.

Off-street loading spaces would have to accommodate standard single-unit trucks, at a minimum. For some land uses, such as industrial or port-related, where larger vehicles would be used in a regular basis, the off-street loading areas would need to accommodate semi-trailer and twin-trailer trucks.

IMPLICATIONS OF MISSION BAY ALTERNATIVES ON TRANSPORTATION PLANS AND POLICIES

Supporting and conflicting plans and policies exist at both local and regional levels to guide the development of transportation facilities and services in the Mission Bay Project Area. The three Alternatives for the Project Area each represent different policy implications, both at the project level and regionally. Those aspects of the Alternatives that would affect plans and policies outside the Project Area are considered to have off-site implications, while those aspects that would affect only facilities and services within the Project Area are considered to have on-site implications.

I-280 Transfer Concept Program (TCP)

The I-280 TCP calls for removal of the stub end of I-280 and of the Fourth/Berry off-ramp, and provision of new ramps. Both of these projects would be implemented under all the Alternatives. King Street would be widened and upgraded to become the direct roadway connection between The Embarcadero and I-280 at the ramps at Sixth and King Streets. Design and construction of the upgrading of King Boulevard would be coordinated with the construction of MUNI Metro tracks west to the existing CalTrain Station at Fourth and King Streets. (MUNI Metro tail tracks would extend to Sixth Street.) Selection of the Mission Bay Plan, and its related development agreement, would affect the decision on further extension of MUNI Metro trackage, because the main tracks would have to be extended west to Seventh and Channel Streets to serve the relocated CalTrain station with Alternatives A and B.

The I-280 TCP recommended construction of a MUNI Metro station at Fourth and King Streets to serve the CalTrain terminal, and a maintenance yard directly west of the CalTrain passenger terminal. With Alternative N, a site for MUNI Metro's storage facility and maintenance yard as proposed in the I-280 TCP could be preserved. That site could be where CalTrain maintenance functions occur now west of Fifth Street, or it could be south of King Street or under I-280 if CalTrain does not move its maintenance to a new site outside San Francisco. With Alternatives A and B, however, a new site would have to be found.

The MUNI Metro stop near Fourth and King Streets would need to be capable of handling passenger volumes associated with transfers from CalTrain to MUNI only if the existing CalTrain terminal were to remain or if an underground CalTrain terminal were built at the same location. If, however, the CalTrain terminal were relocated to Seventh and Channel Streets or if an underground CalTrain station were built near Fourth Street as part of a downtown extension of CalTrain, then the passenger-serving design requirements for MUNI Metro would be more oriented to serve demand from activities in the Project Area.

Because MUNI Metro on King Boulevard is planned to operate in the median with all three Alternatives, a grade-separated concourse might be required for passengers to transfer safely between CalTrain and MUNI Metro. With each Metro car 70 to 90 feet long and possible four-car trains, a 280- to 360-foot-long stop would be required for MUNI Metro.

A tail-track / turnback facility would be required for MUNI Metro behind (west or south of) the CalTrain terminal. With Alternatives A and B, that approximately 1,000-foot-long facility would be south of Seventh and Channel Streets under I-280, west of Owens Street. (That Metro terminal is assumed for this EIR analysis.) With Alternative N, the tail-track / turnback facility could be west of the CalTrain terminal, if MUNI intends to extend Metro service subsequently to the Showplace Square area, or further south under I-280, if MUNI intends to extend Metro service to the south.

CalTrain Extension

The primary off-site policy implications of the Alternatives concern the location of CalTrain's San Francisco terminal. Caltrans, the current operator of CalTrain, has stated that its primary service development objective is the extension of service from Fourth and Townsend Streets north to the TransBay Terminal./106/ The latest five-year plan for CalTrain prepared by Caltrans contains extensive discussion of the conditions resulting from the terminal relocation proposed with Alternatives A and B, and states that relocation to Seventh and Channel Streets is essentially unacceptable to Caltrans on the basis of the resultant loss of CalTrain ridership./107/

A study to identify the complete costs of a CalTrain extension to the TransBay Terminal and of interim terminal locations in San Francisco was recently completed under the direction of the Joint Powers Board of the as-yet-unformed Joint Powers Agency (JPA)./60/ The results of that study were used by MTC to adopt Resolution 1876, which recommends Federal and local funding for the extension of CalTrain to downtown./47/ The regional consensus reached on funding for CalTrain is dependent on the additional tax revenues approved by San Mateo County voters on June 7, 1988, and on securing funding from San Francisco and Santa Clara Counties and the Federal government. State funding will not be sought, as the California Transportation Commission opposes the CalTrain extension. Funds are expected to be programmed in MTC's 1989-1993 Transportation Improvement Program for engineering and construction of the CalTrain extension into downtown, pending the outcome of an environmental impact analysis.

Relocation of the at-grade CalTrain terminal from Fourth and Townsend Streets is proposed with Alternatives A and B, while the terminal would remain at Fourth and Townsend Streets with Alternative N. Alternatives A and B would be in conflict with Caltrans' policy for CalTrain. None of the Alternatives for the Project Area contains explicit (physical or design) provisions for construction of an extension of CalTrain to downtown, nor preservation of a right-of-way from Seventh and Channel Streets to the eastern or northern boundary of the Project Area. The Mission Bay Plan does call for the preservation of right-of-way under King Boulevard, although an easement on property owned by the Project Sponsor would still be necessary for a CalTrain extension.

The extension of MUNI Metro along King Street could potentially preserve a right-of-way for an underground CalTrain extension, if provision for the CalTrain extension were made at the time of construction of the Metro. Possible ways would include construction of a subway or underground tube in conjunction with construction of MUNI Metro. However, subsequent construction of the CalTrain extension would incur substantial additional cost (if the cut-and-cover construction technique is not used), or would disrupt Metro service and surface street operations during that construction (if the cut-and-cover construction technique is used).

With Alternatives A and B, later extension of CalTrain under King Street thus would be much more costly, because of the loss of a lower-cost construction opportunity with far fewer disruption impacts on traffic circulation. A feasible right-of-way under the blocks adjacent to King Street would not be available, unless the design of building structures and utility installations preserved a subterranean space for the extension.

Although the extension of CalTrain into the TransBay Terminal under King Boulevard, The Embarcadero and Main Street represents the alignment preferred by Caltrans, other possible underground routes have been mentioned. One of those options would follow Third Street or Second Street from King Street north and east into the TransBay Terminal north to the Montgomery Street BART Station. That subway alignment, which could be designed to serve a new MUNI Metro line running north-south along the Bayshore Corridor, connecting with a new line along Geary Corridor, has not been analyzed to the same degree of detail as the alignment preferred by Caltrans. Until such impact analysis is done, the implications of the Alternatives on optional alignments in Mission Bay (or vice versa) cannot be determined. As with the case of the preferred alignment, however, construction feasibility would be enhanced with preservation of an underground right-of-way below city streets or under blocks to be developed.

MUNI Metro Extension

MUNI's 1987-1992 Short Range Transit Plan (SRTP) calls for extension of Metro service via a reconstructed roadway on The Embarcadero and King Street to the CalTrain terminal at Fourth and Townsend Streets./62/ Preliminary and final engineering and construction costs are programmed in the Capital Improvement Program for the 1987 to 1992 period. Further extension of service to Seventh and Channel Streets is the subject of negotiations for the development agreement for Mission Bay, although MUNI considers the Mission Bay Project Sponsor to be responsible for the cost of the extension. Both Alternatives A and B would require the Metro extension to Seventh and Channel Streets. Alternative N would require the Metro extension only to Fourth and Townsend Streets.

Rail Freight Service and Truck Access

The Central Waterfront Plan calls for provision of adequate rail and truck access to all maritime piers. At an off-site level, Alternatives A and B would affect rail access to the Northern Waterfront, as existing trackage on Illinois Street would be retained only to China Basin Street. Trackage would be provided on China Basin Street north to the Belt line trackage and across the Third Street Bridge. Thus, rail freight access to the Northern Waterfront would be preserved. With Alternatives A and B, service to the new China Basin track would require use of the existing Indiana Street lead to Illinois Street, or new track south of the Project Area at Islais Creek (see Figures VI.E.14 and VI.E.15, pp. VI.E.155 and VI.E.157, respectively). Alternative N would retain existing mainline trackage and connections from existing or modified lead tracks to serve the Central and Northern Waterfront and Inner Mission areas.

A study to identify the complete costs of a CalTrain extension to the TransBay Terminal and of interim terminal locations in San Francisco was recently completed under the direction of the Joint Powers Board of the as-yet-unformed Joint Powers Agency (JPA)./60/ The results of that study were used by MTC to adopt Resolution 1876, which recommends Federal and local funding for the extension of CalTrain to downtown./47/ The regional consensus reached on funding for CalTrain is dependent on the additional tax revenues approved by San Mateo County voters on June 7, 1988, and on securing funding from San Francisco and Santa Clara Counties and the Federal government. State funding will not be sought, as the California Transportation Commission opposes the CalTrain extension. Funds are expected to be programmed in MTC's 1989-1993 Transportation Improvement Program for engineering and construction of the CalTrain extension into downtown, pending the outcome of an environmental impact analysis.

Relocation of the at-grade CalTrain terminal from Fourth and Townsend Streets is proposed with Alternatives A and B, while the terminal would remain at Fourth and Townsend Streets with Alternative N. Alternatives A and B would be in conflict with Caltrans' policy for CalTrain. None of the Alternatives for the Project Area contains explicit (physical or design) provisions for construction of an extension of CalTrain to downtown, nor preservation of a right-of-way from Seventh and Channel Streets to the eastern or northern boundary of the Project Area. The Mission Bay Plan does call for the preservation of right-of-way under King Boulevard, although an easement on property owned by the Project Sponsor would still be necessary for a CalTrain extension.

The extension of MUNI Metro along King Street could potentially preserve a right-of-way for an underground CalTrain extension, if provision for the CalTrain extension were made at the time of construction of the Metro. Possible ways would include construction of a subway or underground tube in conjunction with construction of MUNI Metro. However, subsequent construction of the CalTrain extension would incur substantial additional cost (if the cut-and-cover construction technique is not used), or would disrupt Metro service and surface street operations during that construction (if the cut-and-cover construction technique is used).

With Alternatives A and B, later extension of CalTrain under King Street thus would be much more costly, because of the loss of a lower-cost construction opportunity with far fewer disruption impacts on traffic circulation. A feasible right-of-way under the blocks adjacent to King Street would not be available, unless the design of building structures and utility installations preserved a subterranean space for the extension.

Although the extension of CalTrain into the TransBay Terminal under King Boulevard, The Embarcadero and Main Street represents the alignment preferred by Caltrans, other possible underground routes have been mentioned. One of those options would follow Third Street or Second Street from King Street north and east into the TransBay Terminal north to the Montgomery Street BART Station. That subway alignment, which could be designed to serve a new MUNI Metro line running north-south along the Bayshore Corridor, connecting with a new line along Geary Corridor, has not been analyzed to the same degree of detail as the alignment preferred by Caltrans. Until such impact analysis is done, the implications of the Alternatives on optional alignments in Mission Bay (or vice versa) cannot be determined. As with the case of the preferred alignment, however, construction feasibility would be enhanced with preservation of an underground right-of-way below city streets or under blocks to be developed.

MUNI Metro Extension

MUNI's 1987-1992 Short Range Transit Plan (SRTP) calls for extension of Metro service via a reconstructed roadway on The Embarcadero and King Street to the CalTrain terminal at Fourth and Townsend Streets./62/ Preliminary and final engineering and construction costs are programmed in the Capital Improvement Program for the 1987 to 1992 period. Further extension of service to Seventh and Channel Streets is the subject of negotiations for the development agreement for Mission Bay, although MUNI considers the Mission Bay Project Sponsor to be responsible for the cost of the extension. Both Alternatives A and B would require the Metro extension to Seventh and Channel Streets. Alternative N would require the Metro extension only to Fourth and Townsend Streets.

Rail Freight Service and Truck Access

The Central Waterfront Plan calls for provision of adequate rail and truck access to all maritime piers. At an off-site level, Alternatives A and B would affect rail access to the Northern Waterfront, as existing trackage on Illinois Street would be retained only to China Basin Street. Trackage would be provided on China Basin Street north to the Belt line trackage and across the Third Street Bridge. Thus, rail freight access to the Northern Waterfront would be preserved. With Alternatives A and B, service to the new China Basin track would require use of the existing Indiana Street lead to Illinois Street, or new track south of the Project Area at Islais Creek (see Figures VI.E.14 and VI.E.15, pp. VI.E.155 and VI.E.157, respectively). Alternative N would retain existing mainline trackage and connections from existing or modified lead tracks to serve the Central and Northern Waterfront and Inner Mission areas.

Alternatives A and B would result in the relocation (away from the Project Area) of maritime and maritime-related activities requiring backlands, probably south toward the vicinity of the North and South Container Terminals at Islais Creek, and to other Bay Area maritime activity centers. Relocation would occur more rapidly with Alternative A than with Alternative B. Truck and rail freight movements generated by those activities also would be shifted toward those other maritime activity centers. However, the amount of rail traffic that would be relocated is small (currently averaging one railcar per week). The amount of truck traffic relocated would also not represent a significant impact, because of the small numbers of truck trips involved. Impacts of relocated truck trips would not be significant even in the areas serving the Container Terminals. Much of this traffic already traverses the area in the vicinity of the Port's Container Terminals, because that is where many of San Francisco's industrial, warehouse and distribution businesses are located.

From a transportation standpoint, all of the Alternatives would comply with the objectives of the Central Waterfront Plan to provide truck access to maritime activities in the area. A route for twin-trailer trucks is designated on Third Street in all the Alternatives. With Alternatives A and B, trucks would be permitted on Fourth Street (north of Third), Mission Rock, Owens, Iowa, King, Townsend, Mariposa, China Basin, and 16th Streets. With Alternative N, truck access would not be restricted on any street in the Project Area.

Bicycles

All of the Alternatives are responsive to the objective of the Transportation Element of the Master Plan and the Central Waterfront Plan for provision of bicycle facilities in the Project Area. Alternatives A and B would retain the signed routes on Third and Fourth Streets and would add signed bicycle routes on Berry and 16th Streets. Alternative N would add only the 16th Street route.

Transportation Projects in the Bayshore Corridor

Development of Mission Bay could affect and be affected by planned or proposed implementation of roadway and transit projects in the Southeast quadrant of San Francisco. First, the use of Third Street north of Islais Creek as a supplement and bypass to the U.S. 101 and I-280 freeways would not be changed significantly by construction of the partial Evans Avenue (Islais Creek) interchange at I-280. Second, the provision of MUNI Metro service to the Bayshore Corridor could be enhanced or delayed, depending on the alignment selected through the Mission Bay Project Area, and the related local and regional decisions to maintain CalTrain service. (Those decisions about CalTrain service would themselves affect and be affected by the Mission Bay Alternatives.)

Third Street

In other areas of San Francisco there are a variety of arterials available to serve traffic from the Downtown & Vicinity and other areas of San Francisco. Third Street, however, is the only arterial serving north-south traffic in the entire Bayshore Corridor of San Francisco south of the Downtown & Vicinity. As a result, vehicular travel from the Downtown & Vicinity, northern San Francisco, or (less so) the North Bay and East Bay toward Southeast San Francisco (or from southeast San Francisco toward the other areas mentioned) is likely to use Third Street for the following reasons:

- When U.S. 101 and I-280 are severely congested and congested, respectively, north of and through the U.S.-101 / I-280Interchange, Third Street is used by through traffic, because total travel time on the freeway routes would be noticeably longer than on Third Street. This condition occurs and would continue to occur during a.m. and p.m. peak periods. While both southbound and northbound travel would be affected during a.m. and p.m. peak periods as I-80 and U.S. 101 are increasingly congested in both directions, overflows to Third Street would occur primarily in the northbound direction during a.m. hours and in the southbound direction during p.m. hours. The I-280 freeway segment between Mission Bay and U.S. 101 is expected to continue to operate at adequate but congested LOS in the peak direction and a high (good) LOS in the non-peak direction. As traffic on I-280 would travel faster than that along Third Street, particularly along the Project Area, I-280 would serve overflow traffic from U.S. 101 more than would Third Street.

- Of the north-south streets in the South-of-Market area, only Third, Fourth and Seventh Streets extend south of China Basin Channel.

- Only Seventh Street connects directly to a north-south street south of the Project Area, but that arterial, Pennsylvania Avenue, does not cross Islais Creek Channel.

As there are no plans to build new roadways or modify existing ones to extend the South-of-Market grid further south into the Showplace Square area and Potrero Hill, the characteristics described above are expected to continue into the future.

Two highway construction projects, one proposed for I-280 near the Hunters Point area and the other associated with Alternatives A and B in the Project Area, would have limited effects on the use of Third Street. The implications of the second project, the construction of an Owens Street Bridge over China Basin Channel, are incorporated in the analysis of street intersections in the Project Area, pp. VI.E.140-VI.E.148; and pp. VI.E.166-VI.E.175.

Caltrans and the San Francisco Department of Public Works are planning the construction of on- and off-ramps to or from the south at I-280 and Evans Avenue. That project would provide a more direct connection of the Hunters Point Naval Shipyard and the Port's Southern Container Terminal with the South Bay via I-280.

Construction of the new Evans Avenue ramps would reduce traffic flows through the intersections of Third Street with Army and with 25th Streets, but the use of Third Street north of 25th Street would not be affected significantly by the new ramps to or from the south. If ramps to and from the north on I-280 were also built in the Islais Creek area, those ramps would tend to reduce the use of Third Street through the Project Area.

MUNI Metro Service to the Bayshore Corridor

For years, MUNI's long-range planning for Metro extensions has included the Third Street / Bayshore Corridor, but implementation of a possible extension has awaited construction of the Turnback Project on The Embarcadero south of Market Street, and extension of the Metro to the CalTrain station. The location of the CalTrain station in Mission Bay would influence the alignment and service function of MUNI Metro in the Bayshore Corridor. More choices for the future alignment of MUNI Metro service south of the Mission Bay Project Area would remain with Alternative N than with Alternatives A and B. However, without the Mission Bay project sponsor providing a right-of-way such as along King Street with Alternatives A and B, right-of-way costs could make the capital costs of an extension across the Project Area higher with Alternative N.

With Alternative N, the CalTrain station would remain at Fourth and Townsend Streets and MUNI Metro's tracks could proceed south to cross China Basin Channel at Fourth Street, or could continue west and then south to cross China Basin Channel at a new bridge, or under I-280 (if underground tracks are built for CalTrain). South of China Basin Channel, MUNI Metro tracks could continue south along the Southern Pacific right-of-way parallel to CalTrain, run on Fourth Street onto Third Street, or return east to Third Street from an alignment further west in the Project Area to serve the Bayshore Corridor.

With Alternatives A and B, the MUNI Metro service must reach the relocated CalTrain station at Seventh and Channel Streets. MUNI Metro would provide a rail transit connection that would supplement MUNI bus service to reduce some of CalTrain's patronage losses projected to follow the relocation of the CalTrain terminal further out from Downtown. MUNI Metro service must therefore cross China Basin Channel at Owens Street to provide for a convenient short-distance transfer at the CalTrain station. (That transfer connection, however, would be far less significant if CalTrain were extended into downtown. Having reached the western section of the Project Area in the vicinity of the Showplace Square area, the MUNI Metro trackage could then be extended south along Owens Street to 16th Street, where the next alignment choice would occur - veer east to Third Street or continue parallel to the SP mainline.

If CalTrain service continues to be provided as has been assumed in this analysis, selection of the alignment or right-of-way to use for the southern extension of MUNI Metro service past the CalTrain Station in Mission Bay would be affected by a number of factors. Schedule conflicts could prevent the use of tracks shared with CalTrain, and capital costs would be incurred to lower the existing trackbed through tunnels to provide clearance overhead for the electrical wire required for MUNI Metro power. In addition, the potential perception that the same travel markets are receiving additive service could make it difficult to extend MUNI Metro south of the Project Area, except along Third Street. With this scenario, the major purposes of extending MUNI Metro into the Bayshore Corridor (on Third Street) would be to provide more capacity (though not a significantly faster trip) than the 15-THIRD bus route and more convenient service from the Bayshore Corridor to the rest of the MUNI Metro lines and the Downtown & Vicinity.

If CalTrain service were discontinued, MUNI Metro service could be extended south as far as San Francisco International Airport using SP's Peninsula mainline trackage. In that case, MUNI Metro trains would operate in a protected environment, separate from street traffic. Operating speeds would be similar to those of the Market Street subway, which would be much higher than the operating speeds that could be achieved on Third Street. Use of the SP mainline right-of-way would provide light rail rapid transit service (with typical average operating speeds of 30 to 35 mph including stops) while the use of Third Street would provide streetcar service (with typical average operating speeds of 10 to 15 mph including stops).

MITIGATION

The mitigation measures recommended to address the transportation impacts identified are presented in this section. Mitigation measures are presented first for project-related impacts and second for Regional / Cumulative impacts. The distinction between these two types of impacts is a result of the context used for the impacts analysis evaluation.

Project-related impacts focus on streets and intersections, transit services, parking, and other transportation facilities or services within or near the Project Area. Project-related impacts are caused by development of the Project Area under Alternatives A, B, and N.

At the project-related level for both year 2000 and 2020 impacts, capacity assumptions incorporated into the impact analyses reflect the street, transit and rail freight networks, and pedestrian and bicycle facilities described in Chapter V. The EIR Alternatives and Approval Process, Table V.3, p. V.20. Those transportation features are not repeated in this section, except as necessary to describe the mitigation measures.

Regional/cumulative impacts are evaluated in the context of regional freeway and transit systems, or transportation systems serving the City as a whole. Cumulative impacts are those that would be generated by changes occurring in the Downtown & Vicinity (including Mission Bay), and the rest of the City and Bay region.

Mitigation measures presented in the following pages are listed in the following order as applicable: Roadway Network, Transit, Maritime, Rail Freight, Parking, and Pedestrian/Bicycle. Within these functional categories, measures that apply to travel across specific screenlines are listed in the following order: "North Bay," "East Bay" and "South Bay." Mitigation measures that would apply to MUNI screenlines or travel across two or more screenlines, are listed next under "Downtown & Vicinity."

Following each mitigation measure is a brief qualitative assessment of potential impacts attributable to the mitigation measure itself. Finally, the status of the measure is briefly described, e.g., whether the measure needs approval or funding and what agencies would be responsible for implementation of the measure.

The mitigation measures address measures beyond those "reasonably assured capacity" increases assumed in the cumulative impact analyses for 2000. The reasonably assured capacity improvement assumptions are based on the Regional Transportation Plan and supporting resolutions adopted by MTC, and current (five-year) programs of transit and highway agencies. Definition of the reasonably assured level of capacity was deemed necessary to provide a realistic forecast of future conditions against which the project-related and cumulative impacts could be assessed. (See p. VI.E.56 for a more detailed discussion). If mitigations are recommended that go beyond the reasonably assured capacity improvements for the year 2000, they are identified as "Mitigations for Consideration."

Project-Related Measures, Year 2000

The following mitigations address impacts resulting from the Alternatives during the period up to year 2000. In the course of addressing detailed design and construction issues associated with development of individual buildings, other measures may be required to mitigate impacts that cannot be specified at this time.

Transportation features defined as components of the Alternatives are not identified formally as mitigation measures, even though they may serve to accommodate or reduce project impacts. Those improvements are listed in V. The EIR Alternatives and Approval Process, Table V.3, p. V.20, and Figures V.1 and V.2, pp. V.12 and V.14. Some of those improvements are mentioned in the course of describing some mitigation measures which follow. For the purpose of this subsection, mitigation measures consist only of those measures needed to mitigate Project-related impacts that are not already defined as part of the Project Alternatives.

Roadway

Measure	Alternative	Description
E.1	A,B,N	To retain adequate space for maritime-related truck and rail freight activities on China Basin Street and to ensure adequate capacity for maritime freight loading operation in the future, retain two travel lanes on this street, but preserve two full additional lanes for truck loading operations in all Alternatives unless adequate off-street loading areas are provided. Two travel lanes are adequate for the traffic demand forecast. Since China Basin

Measure	Alternative	Description
		Street currently operates with this configuration, this measure would not require any change to the existing right-of-way.
E.2	A,B	To mitigate potential conflicts with high traffic volumes on the Third and Fourth Street Bridges, encourage the use of bicycles and pedestrian travel on the new Owens Street Bridge over China Basin Channel in Alternatives A and B by providing width for one vehicle lane, one bicycle lane and a sidewalk in each direction. Traffic volumes projected to be traveling over the Owens Street Bridge could be adequately accommodated on two lanes. The bicycle lanes would accommodate north-south bicycle movement in the Project Area across the channel, supplementing north-south access on Seventh Street.
E.3	A,B,N	To have these intersections operate at LOS D, implement the following measures:
E.3a		Restripe Mariposa Street between the I-280 ramps and Mississippi Street; Seventh Street north of 16th Street; and Pennsylvania Avenue between Seventh and Mariposa Streets to four travel lanes (within the existing right-of-way); and
E.3b		Install traffic signals when warranted by traffic volume approval criteria at the intersections of Mississippi and Mariposa Streets, Mississippi and Seventh / 16th Streets, and Pennsylvania Avenue and Mariposa Street.
		These measures would improve safety and reduce delay at these intersections, as compared to operations forecast for year 2000 volumes. The measures would require funding and the approval of signal installation and design by the city Department of Public Works.
E.4	N	To mitigate the cumulative traffic impacts of Alternative N at the intersection of King Boulevard and

Measure	Alternative	Description
		Third Street so that LOS D is achieved, prohibit parking on King Boulevard during peak hours to provide three through lanes in each direction, and provide two left-turn lanes at Third Street.
Transit and Ridesharing		
E.5	A,B	In order to minimize or eliminate traffic congestion and parking problems identified in the Impacts section by limiting auto use, establish a Mission Bay Transportation System Management (TSM) Program for the Project Area. The goal of the TSM program would be to attain the ridesharing, transit, bicycle, and walking use levels for travel by residents and employees of the Project Area that would be consistent with the screenline travel forecasts in this analysis. A TSM Manager would develop the specific program to facilitate and coordinate actions by the City of San Francisco, MUNI, CalTrain, SamTrans, AC Transit, BART, Rides for Bay Area Commuters, and other public agencies whose services or regulatory functions would affect the mode of travel chosen by employees or residents in the Project Area. The objective of the TSM Program would be to reduce travel throughout the day by private automobile to or from Mission Bay. Funding for this program would be required and would involve coordination with transportation planning staff in the Department of City Planning.
E.6	A,B,N	To mitigate the transit operational requirements of the extension of MUNI Metro to Seventh and Channel Streets (with Alternatives A and B), or to Fourth and King Streets (with Alternative N), build a MUNI Metro storage, maintenance, and turnback facility. Acquisition of the site for the turnback facility could require any of the

Measure	Alternative	Description
		following: dedication by the project sponsor or Southern Pacific Transportation Company; purchase by the City; or acquisition through eminent domain. This facility would be approximately three to four tracks wide, and would extend approximately 1,000 feet beyond the final Metro station. The turnback facility would therefore require the use of land either within or south of the Project Area which would preclude other activities that might be considered at the turnback location. The measure would require funding; review and implementation of the facility design would involve the project sponsor, Departments of Public Works and City Planning, MUNI, and the S.F. Public Utilities Commission.
E.7	A,B	To mitigate future demand for MUNI Metro service south of the interim CalTrain Terminal proposed in Alternatives A and B, dedicate a right-of-way that is acceptable to MUNI for an extension of MUNI Metro service south to the edge of the Project Area, and provide an additional Metro stop near 16th Street. If this were the last Metro stop, the turnback facility would be needed south of this location; it would not be required at the Seventh and Channel Street stop. This measure would require additional funding and be implemented by MUNI and the S.F. Public Utilities Commission.
E.8	A,B	To mitigate some of the ridership loss caused by relocation of the CalTrain terminal from Fourth and Townsend Streets to Seventh and Channel Streets in Alternatives A and B, install the following terminal improvements and amenities: – enclosed passenger waiting areas with provision of restroom facilities, ticketing information, security offices, and food / beverage concession services;

Measure	Alternative	Description
		- sufficient parking spaces to meet expected demand within an acceptable walking distance; - secure covered bicycle storage within the station; - an at-grade platform connection between CalTrain and the adjacent MUNI Metro station; - access along Hooper and Owens Streets (for Alternative B), and Alameda and Owens Streets (for Alternative A) to provide adequate circulation and roadway capacity for bus access and automobile pick-up / drop-off at the CalTrain terminal. Funding for these measures would be required, and coordinated approval and/or implementation would be carried out by the agency operating CalTrain, MUNI, and the S.F. Public Utilities Commission.
E.9	A,B	Two approaches are identified to eliminate ridership losses associated with relocation of the CalTrain Station from Fourth and Townsend Streets to Seventh and Channel Streets:
E.9a		Install an underground "box conduit" (tunnel) beneath the improved King Boulevard right-of-way to retain a CalTrain Station in the vicinity at Fourth and King Streets. The underground tunnel would require an easement through property held by the project sponsor around the northwest corner of the Project Area. Construction of the underground terminal should be coordinated with the reconstruction of I-280 ramps and King Boulevard, the Metro extension, and early development phases of Mission Bay in order to minimize traffic impacts and construction costs. Funding for this measure would be required along with review and approval / implementation by the project sponsor, the Departments of Public Works and City Planning, S.F. Public Utilities Commission, Caltrans, and the agency operating CalTrain.

Measure	Alternative	Description
E.9b		Provide bus service and travel times comparable to the accessibility provided at the Fourth and Townsend Street station. All MUNI bus routes serving the Fourth and Townsend Street station would have to be extended to the Seventh and Channel Street Station for MUNI to provide the same level of accessibility. In addition, new MUNI routes would likely be required. MUNI bus and Metro service would have to be improved to the point where travel times to the financial district from the Seventh and Channel station would equal travel time from the Fourth and Townsend terminal, an approximate four-minute difference. To accomplish this objective, dedicated bus lanes on congested streets would be required, or routes realigned to less congested streets to minimize delays on transit. MUNI routes would have to operate with lower headways. Headways would have to be low enough to make Seventh and Channel an acceptable CalTrain terminal; even to those patrons who walk from areas of the Downtown & Vicinity to the Fourth and Townsend station. The technical feasibility of these extensions and service improvements has not been determined. MUNI's operating costs would increase because of the extension of the 15-THIRD and 42-DOWNTOWN LOOP to serve Seventh and Channel Streets, and creation of new routes to serve the C-3 District and South of Market Area (to replace walking trips). Implementation of this measure would require planning and programming approval by MUNI, S.F. Public Utilities Commission, CalTrain, and MTC.
E.10	A,B,N	The following measures would help mitigate cumulative traffic impacts on the operating speeds and schedules of MUNI bus and trolley routes serving the Project Area:
E.10a		Maintain p.m. peak-period exclusive contraflow lanes for MUNI on Fourth Street between Townsend and King Streets;
E.10b		Prohibit parking or loading in the curb lanes of streets used by MUNI, during a.m. or p.m. peak traffic periods;

Measure	Alternative	Description
E.10c		Design the location of MUNI stops to require no movements across lanes at the congested intersections of King Boulevard with Third and Fourth Streets; and
E.10d		Install "Don't Block the Box" street markings at heavily congested intersections to avoid gridlock.
		The installation of these preferential treatments would mitigate the operational impacts on MUNI caused by congestion and would support MUNI's capability to serve the projected travel demand between the Project Area and the Downtown & Vicinity core. Funding would be required for these measures which would involve review and/or implementation by the project sponsor Department of Public Works, MUNI, and the S.F. Public Utilities Commission.
E.11	A,B	To have all MUNI bus routes serving the Project Area operate at LOS D (1.25 passengers per seat) in 2000, additional passenger-carrying capacity would be required for the 47-VAN NESS beyond the reasonably assured capacity assumed in the impact analysis: 17% with Alternative A, or 22% with Alternative B. This mitigation would require additional funding, and implementation by MUNI and the S.F. Public Utilities Commission.
Rail Freight		
E.12	A,B,N	Retain rail freight service to business in, and to the west of the Project Area through 2000, in accordance with applicable laws and statutes: from the SP mainline and lead west of the mainline at 16th Street, via the Western Pacific tracks from Rhode Island to Division, to tracks on Harrison and Florida Streets.

Measure	Alternative	Description
E.13	A,B,N	In order to maintain rail freight service to businesses on Port property north of China Basin Channel under all Alternatives, the Belt Railroad would have to be rerouted. This would be required partly due to implementation of the I-280 Transfer Concept Program that would upgrade King Boulevard and extend MUNI Metro service under all the Alternatives; and relocation of the CalTrain station to Seventh and Channel Streets under Alternatives A and B. Although there could be other possible alignments, one route for the Belt Line is incorporated in the Alternatives, in the transportation features section of Table V.3, p. V.20. Trains could use existing trackage between the SP mainline and Illinois Street tracks in or south of the Project Area; from the Illinois Street tracks which run in the Project Area, build new tracks north along China Basin Street, crossing the channel on the Third Street Bridge to access The Embarcadero track. By 2000, however, partial development under all the Alternatives would allow the 16th Street lead from the SP mainline in the Project Area to remain. Thus an interim, less costly option to retain Belt Line Service in 2000 could be achieved by using the 16th Street lead to access the China Basin Street tracks. This would involve construction of only a part of the China Basin Street tracks, which would have to be fully developed by build-out of the Alternatives. Funding and implementation of this measure (whether for the interim or full alignment) would involve coordination between the project sponsor, Port of San Francisco, Department of Public Works and S.F. Public Utilities Commission.

Parking

Measure	Alternative	Description
E.14	A,B	By 2000, Alternatives A and B would generate an excess parking demand for about 800 and 570 non-residential parking spaces, respectively. If the supply of on-street spaces for non-residential uses is applied to that deficit, there would be a remaining demand for about 150 and 170 parking spaces (on- or off-street) for Alternatives A and B, respectively. Mitigation for parking demand spillover into residential sections within, or areas adjacent to the Project Area, could occur a number of ways depending on what public policy is developed in San Francisco to address the supply of parking:
E.14a		Allow use of vacant land for temporary surface parking lots. Because the Project Area would not be fully developed in 2000, there would be adequate space to accommodate this excess demand on temporary parking lots until they are developed after 2000. The presence of additional, albeit temporary, parking resources, however, would be likely to perpetuate the attraction of intercept parking demand to the Project Area. This could result in more localized circulation problems and congestion, and would remove some of the impetus to use public transit.
E.14b		Increase parking requirements particularly for office and hotel uses, and possibly for retail use, and establish parking facilities for CalTrain users. The amount of additional parking to be provided would depend on the determination of whether and how much on-street curbside parking should be relied upon as a parking resource. Generally, on-street spaces that are metered for short-term periods serve retail uses well. Retail uses have the highest visitor volumes relative to other land uses proposed for the Project Area, thus generating the highest parking turnover and making most efficient use of curbside spaces. Depending on whether curbside parking is determined to be available and acceptable for

Measure	Alternative	Description
		accommodating parking demand associated with office and hotel uses, and the CalTrain terminal, parking requirements for office would have to increase up to 1.35 spaces per 1,000 square feet to offset the parking deficit off-street for that use; increase parking supply for the hotel up to 0.84 spaces per hotel room; and CalTrain up to 0.04 spaces per passenger. Provision of additional parking would be likely to perpetuate the attraction of more cars to the area, and could result in localized circulation problems and congestion. The presence of additional parking resources would also remove some of the impetus to using public transit. Provision of parking at the CalTrain station would not respond to Master Plan policies that encourage the use of local transit to reach regional transit systems in San Francisco.
E.14c		To maximize use of parking facilities in the Project Area, require shared parking between complementary uses in individual buildings or building complexes in Mission Bay, an alternative to increasing parking supply requirements. Such complementary uses include residential and office uses, or M-2 and retail uses, where peak parking demand occurs at different times of the day. By allowing shared parking, a smaller total amount of parking could meet the same demand. This measure would require recommendations by the Planning Department of appropriate shared parking rates considered for approval as part of individual development phases or construction projects by the Planning Commission (and possibly the Board of Supervisors).
E.14d		Increase the cost of parking. By raising the cost of travel to the Project Area by automobile, public transit would become a more attractive mode of travel to more people. This measure would help to reduce vehicular travel during the non-peak commute hours in particular; a high percentage of trips made during the peak commute period is already projected to be made by public transit.

Measure	Alternative	Description
E.15	A,B	To mitigate localized overflow parking impacts from high intensity commercial uses in all three Alternatives, set curbside time limits and/or install parking meters in areas of high parking demand within the Project Area. Time limits would prevent all-day parking by employees where spaces are also needed to serve visitors, resulting in a more efficient use of available curbside supply. This measure would require action by the Department of Public Works and the Police Department. Funding for this measure is not available, but could be generated by parking meter and bail bond revenues.
Pedestrian/Bicycle		
E.16	A,B,N	To provide an adequate level of service for pedestrian travel, sidewalks in Mission Bay should have a minimum clear width of 7.5 feet in residential or M-2 blocks, and 12.0 feet in retail commercial, office and S/LI/RD areas. All streets and sidewalks need to also consider standards regarding driveway location and pedestrian safety at sidewalk / driveway crossings, sidewalk lighting, crosswalks, and handicap ramps. City codes should be reviewed and appropriate standards enforced for development in the Project Area./2/
E.17	N	In order to reduce or eliminate pedestrian conflicts between passenger activity at the CalTrain terminal and Metro station and to reduce high traffic volumes on the improved King Boulevard leading to I-280, a number of measures are possible, including the two options below:
E.17a		Provide pedestrian crossing signals at Fourth and King, and Fifth and King Boulevard. "Green time" to allow pedestrian crossage would have to be coordinated with signal timing

Measure	Alternative	Description
		for traffic flows through the individual intersection, and possibly with integrated timing sequences for a multi-signal network.
E.17b		Provide a grade-separated pedestrian crossing at Fourth and King, and Fifth and King Boulevard. Whether elevated or underground, this option would be more effective in minimizing pedestrian / vehicle conflicts. This option, however would be more costly than item a.
		Both treatments as well as others would require adequate areas for pedestrian queuing. Funding and coordinated implementation would involve the Department of Public Works, MUNI, CalTrain, the project sponsor, and the S.F. Public Utilities Commission.
Project-Related General		
E.18	A,B	To mitigate traffic and parking impacts of the Alternatives, require the project sponsor to develop, and the Planning Commission to approve, standards tailored to special or unique conditions in the Project Area, for each phase of development. The purpose of these standards is to ensure that the design and construction of transportation infrastructure would respond to operational needs, and be consistent with city codes and the final approved Project Area Plan. Such standards include, but need not be limited to:
E.18a		Managing construction-related traffic.
E.18b		Station area design criteria and standards for MUNI Metro and CalTrain.
E.18c		Sidewalk section, width and landscaping standards.
E.18d		Regulations controlling the provision of public parking on vacant land during project development.

Measure	Alternative	Description
E.18e		Traffic signal timing and coordination plans.
E.18f		Off-street parking design standards.
E.18g		Driveway location and sightline minimums.
E.18h		Curb parking zones and time limits.
E.18i		Transit pull out and shelter standards.
E.18j		Loading dock design and access standards.
E.18k		Building entrance location criteria.

Regional / Cumulative Measures, Year 2000

Most of the transportation impacts described for the regional and MUNI screenlines would be caused by growth in the Downtown & Vicinity and the rest of the region, rather than by development in the Project Area. As a consequence, mitigation of those impacts requires action to be taken at a regional rather than a project level. This section presents those mitigations of impacts to the regional transportation system needed with or without additional travel demand from the Project Area.

Substantial shifts from single-occupancy vehicular travel to transit or ridesharing would be necessary in the North Bay and East Bay screenlines by the year 2000 to accommodate projected travel demand within available roadway capacity. The "reasonably assured capacity" increases for transit services and high-occupancy-vehicle (HOV) facilities assumed in the impact analyses would be adequate to supply the capacity to accommodate almost all of these shifts between modes at the screenlines. However, achieving those mode shifts projected would require incentives in both travel time and convenience. For example, in order for travelers to shift to transit and high-occupancy vehicles at the North Bay (Golden Gate) screenline, additional bus routes, expanded bus and ferry schedules and shorter transit travel times would be needed, and HOV lanes benefiting both bus and carpool passengers would have to be extended.

A list of reasonably assured capacity increases is presented below. Those projects would enable substantial shifts from single-occupant vehicle travel to occur, which are assumed only for the travelers from the Downtown & Vicinity, in order to accommodate projected cumulative travel demand (including rest of San Francisco and the region). As a result of these shifts, the East Bay corridor would use all reasonably assured capacity assumed for 2000, and result in transit loadings on BART and AC Transit that would exceed each agency's load factor standard. Load factor standards for Golden Gate Transit also would be exceeded slightly. Mitigation to address those impacts projected to occur beyond the reasonably assured capacity increases are identified below as "Measures for Consideration, 2000."

Reasonably Assured Capacity Improvements, 2000

Regional Highway Corridor – North Bay

- Provide HOV lanes on U.S. 101 (one lane in each direction), such that there is a continuous stretch of exclusive bus and carpool lanes access between the Richardson Bay Bridge and Route 37 in Novato. This freeway segment carries high volumes during the commute periods. An HOV facility already exists between the Richardson Bay Bridge and the Larkspur Ferry Terminal, and in northern San Rafael.

Regional Highway Corridor – East Bay

- Expand roadway capacity for mixed travel modes by widening eastbound I-80 from the Bay Bridge to Ashby Avenue in Berkeley, and add HOV lanes to westbound I-80 from Rodeo to Richmond. The latter improvement would be necessary to provide travel time savings to enhance the use of buses and carpools.
- Provide a reversible facility for HOV / buses from the I-580/I-880/I-80 interchange east to the Route 24 interchange.

Regional Highway Corridor – South Bay

- Widen U.S. 101 by one lane in each direction from San Carlos south to the San Mateo / Santa Clara County line, providing a total of eight lanes from Santa Clara County to San Francisco.

Regional Transit – North Bay

- Increase Golden Gate Transit Transbay bus service capacity by 29%, and ferry service capacity by 39% over 1985 levels.

Regional Transit – East Bay

- Increase frequency of BART transbay trains (and therefore BART's passenger-carrying capacity) by 65% in the peak hour and by 63% during the peak period, over 1985 levels. BART's planned operational capacity would therefore be reached during the peak hour but not the peak period.
- Increase peak period Transbay capacity on AC Transit by approximately 8% over 1985 levels.

Regional Transit - South Bay

- Construct a BART turnback at Daly City and a yard at Colma, to enable more rapid train turnaround and thus increased capacity for San Francisco service.

- Extend BART trackage to and provide a new station at Colma, in conjunction with a new maintenance yard and rail track.

- Increase peak-period passenger capacity on SamTrans routes serving San Francisco County by reducing headways on existing routes and creating new routes.

Downtown & Vicinity - Transit

- Provide several thousand additional parking spaces at stations throughout the system, and coordinate with bus transit operators to enhance feeder service to BART stations. These measures would reduce BART parking supply constraints and increase ridership from the Downtown & Vicinity during the peak period (and off-peak period).

- Install an automated BART wayside train control system and acquire 150 new Type-C cars. This would permit BART to deploy more trains at reduced headways, increasing passenger carrying capacity to achieve higher ridership levels in the Downtown & Vicinity.

- Purchase 50 additional MUNI light rail vehicles, build a new light rail storage and maintenance facility, extend streetcar service from Market Street along The Embarcadero to Fisherman's Wharf (the "F" line), and extend the "J" line to the present Metro rail car maintenance facility at the Balboa Street station.

- Build the MUNI Metro Turnback to Steuart Street near Howard, which would allow an increase in Market Street subway capacity by approximately 50% over 1985 levels.

- Increase MUNI peak-period passenger-carrying capacity by the following percentages:

  a) Northeast Screenline: +11%
  b) Northwest Screenline: +11%
  c) Southwest Screenline: +21%
  d) Southeast Screenline: +5%

  These service increases for MUNI screenline corridors are consistent with the increases on the various individual routes assumed in the analysis to serve the Project Area in 2000 among the three Alternatives: 15-THIRD, 30-STOCKTON, 47-VAN NESS, 22-FILLMORE, 81-X BATTERY-SANSOME EXPRESS, and 42-DOWNTOWN LOOP. The service increases could be accomplished by deploying (higher capacity) articulated bus and trolley coaches on all the routes and maintaining the same headways as provided in 1985, as assumed in the impact analysis. Other combinations of articulated transit vehicles and headways providing the same passenger-carrying capacity are possible.

- Extend two at-grade MUNI Metro tracks south and west from the Metro Turnback along The Embarcadero and within the median of a widened King Boulevard (now King Street) to the CalTrain terminal at Fourth and Townsend

Streets for Alternative N and Seventh and Channel Streets for Alternatives A and B. At the terminal, construct facilities for passenger transfer between CalTrain and MUNI. Those facilities could include either a median Metro with grade-separated walkways, or side-by-side platforms with at-grade platform transfer. Rail tracks would continue at least 1,000 feet beyond the platforms in all Alternatives.

Measures for Consideration, 2000

The following measures would mitigate cumulative impacts identified as a result of regional growth (including the EIR Alternatives) by the year 2000, after assuming the implementation of the "reasonably assured capacity" improvements.

Regional Highway and Transit - North Bay

Measure	Alternative	Description
E.19	A,B,N	To encourage HOV use to the North Bay, dedicate exclusive bus / HOV lanes during the p.m. peak commute period on the San Francisco roadway approaches to the Golden Gate Bridge: Doyle Drive, Lombard Street from Van Ness Avenue to the Bridge; and Van Ness Avenue between North Point and Lombard Streets. This could be accomplished by converting parking lanes (where parking would be prohibited during the peak period), or by dedicating a lane in the non-peak direction for HOV travel in the peak direction. (Such a contraflow lane in the non-peak direction could require dedicating a second lane to establish a buffer between opposing traffic.) Such roadway modifications could result in reduced travel speeds and parking shortages, at least during the peak commute periods. Funding and implementation would require coordination among Caltrans, the San Francisco Department of Public Works, MUNI, the S.F. Public Utilities Commission and the Golden Gate Bridge and Highway District.
E.20	A,B,N	To relieve passenger crowding on Golden Gate Transit buses, increase Transbay bus service capacity by about 5%

Measure	Alternative	Description
		over reasonably assured year 2000 capacity increases assumed in the impact analysis. This measure would involve funding to add vehicles and increase scheduled service, and implementation by the Golden Gate Bridge and Highway District.
E.21	A,B,N	Provide intercept parking areas in the North Bay to encourage the formation of more carpool trips. Such "park and ride" lots provide a place for drivers to leave their cars and ride together. Funding, site location, and implementation would involve the local municipalities, and would involve coordination between Caltrans and the Golden Gate Bridge Highway and Transportation District, and local governments.
E.22	A,B,N	To further encourage the use of transit and ridesharing, increase bridge tolls for single-occupant vehicle trips, particularly during commute periods. Current toll premiums on the Golden Gate Bridge are applied on weekends, and could be applied on all weekdays. Implementation would require action by the Golden Gate Bridge and Highway District.
Regional Transit - East Bay		
E.23	A,B,N	To relieve passenger crowding on BART Transbay operations, deploy more trains up to BART's peak period service capacity of 2.25 minute headways between 10-car trains, to meet that carrier's load factor standard of 1.5 passengers per seat. Such an expansion to maximize peak period service would also result in some additional service capacity beyond the two-hour peak period. Thus, some additional modal shifting could occur which would reduce somewhat the estimated 4.5-hour congestion period projected in the impact analyses. This measure is

Measure	Alternative	Description
		technically feasible, and would not require the purchase of additional cars beyond the number assumed to exist by 2000 in the impact analysis. However, BART could require additional funding to expand its operations.
E.24	A,B,N	To reduce cumulative vehicular travel demand on the Bay Bridge, MTC should rescind its policy of discouraging AC Transit Transbay service expansion. Additional AC Transit service would be needed to relieve overcrowding on BART by the year 2000 (assuming no further BART service increases beyond those assumed in the impact analysis), and to meet their load factor standard of 1.25 passengers per seat. That would result in an increase of about 30% beyond the AC Transit service levels assumed in the impact analysis. Additional funding as well as policy changes would be required before coordinated implementation by MTC, BART and AC Transit could be carried out.
E.25	A,B,N	As identified for the Golden Gate Bridge, increase Bay Bridge tolls for single-occupant vehicles trips; particularly during commute hours. Implementation would be the responsibility of MTC.

Regional Transit - South Bay

Mitigation measure options in E.9, regarding the retention of CalTrain service at Fourth and King Streets (underground) or providing MUNI service to the Seventh and Channel Street station to reduce travel times to those available at the Fourth and Townsend Street station, would result in up to a 22% increase in ridership above the levels projected in the impact analysis. Such an increase would reduce vehicular travel on U.S. 101 during the peak period to the South Bay, thereby reducing the projected 2.5-hour duration of congestion presented in the analysis.

MUNI - Downtown & Vicinity

Measure	Alternative	Description
E.26	A,B,N	To reduce passenger crowding in order to meet an overall load factor standard of 1.25 passengers per seat on MUNI, increase capacity on the Northwest corridor by about two percent during the peak hour, and by about 5% on the Northeast corridor during the peak period. These increases, which are above and beyond the capacity assumptions in the impact analysis for 2000, would require funding and implementation by MUNI.
E.27	A,B,N	To further facilitate use of inter-regional transit service, establish coordinated regional transit pass programs between MUNI and AC Transit, Golden Gate Transit and SamTrans. Such arrangements already exist between MUNI and BART, and AC Transit and BART. Implementing this measure would involve coordination between MTC, and the affected local transit service operators.
E.28	A,B,N	To generate additional revenues for possible transportation-related improvements serving San Francisco, increase the State gas tax. Most future transportation improvements would rely to some degree on this fund. Implementation would require an affirmative vote by the State legislature and possibly the electorate of California.

YEAR 2020 MITIGATION

The following list of measure for year 2020 begins with Project-Related measures, followed by measures to mitigate regional travel demand impacts including the project Alternatives.

As there are no reasonable assurances regarding future regional highway and transit capacity for the year 2020, there are no "reasonably assured capacity" improvements for that year; therefore all mitigation measures are identified as "Measures for Consideration." Impact analysis for a more distant future is necessarily less precise, since the year 2020 exceeds the existing planning horizon for transportation system development. The 2020 mitigation measures are expressed for the most part as suggestions for levels of magnitude and types of projects required to expand transportation capacity, to accommodate estimated travel demand in 2020, beyond the mitigation measures presented above for year 2000.

In some instances where possible, percent increases in service capacity for various modes are indicated, based on the quantitative analysis in the impacts section. However, due to the distant timeframe of the analysis, those increases are simply approximations of mitigation that would need to be considered.

The 2020 mitigation measures are not recommendations for a single best option, but rather a list of possibilities that could mitigate the 2020 travel demand projected in the impact analysis. Determining the best set of improvements for that future time frame would require a more comprehensive evaluation than presented here. All would involve additional funding and approval by MTC, the various affected local transportation agencies, as well as state and federal planning and funding agencies.

At the Project-related level, capacity assumptions incorporated in the 2020 impact analyses reflect build-out of the street and transit network, rail freight network, parking supply and pedestrian/bicycle facilities contained in the EIR Alternatives, as described in Chapter V. The EIR Alternatives and Approval Process, p. V.20. These transportation features are not repeated in this section, except as necessary to describe the mitigation measures.

Project-Related Measures, Build-Out/2020

Roadway

Measure	Alternative	Description
E.29	A,B	To mitigate cumulative traffic impacts at the intersection of King Boulevard at Third Street so that LOS D is achieved, implement the following supporting actions:

Measure	Alternative	Description
E.29a		Prohibit parking on King Boulevard during the peak period, providing three through lanes in each direction, with two left-turn lanes at Third Street and one left-turn lane at Fourth Street.
E.29b		Improve the capability and capacity of transit services connecting the rest of downtown San Francisco to the Peninsula to reduce auto travel through the Project Area and vicinity (see "Regional Transit Corridor - South Bay" mitigation, p. VI.E.218).
E.30	N	To mitigate cumulative traffic impacts at the intersection of King Boulevard and Fourth Street so that this intersection operates at LOS D, provide a separate left turn lane (southbound). (The six-lane King Boulevard with double left turn lanes at Third Street is included as a mitigation measure for Alternative N in 2000.)
E.31	A	To mitigate traffic impacts at the intersection of Third and Mariposa Streets to have it operate at LOS D, implement one of the following improvements:
E.31a		Widen the Third Street southbound approaches or prohibit parking to allow a double right turn onto Mariposa, and provide an exclusive left turn on Mariposa Street onto Third Street; or
E.31b		Align Owens Street with the I-280 on- and off-ramps at Mariposa Street, and widen Owens Street between King Boulevard and Mariposa to four lanes. This measure would divert some traffic to Owens Street and thereby improve the LOS at Third and Mariposa Streets. The resulting p.m. peak LOS on Owens Street would still be acceptable.
Transit		
E.32	A,B,N	To mitigate the cumulative peak-period ridership (including ridership associated with all EIR Alternatives) on the LOS of MUNI Metro and bus routes serving the

TABLE VI.E.30: ESTIMATED MUNI SERVICE INCREASES REQUIRED TO MEET MUNI LOAD FACTOR STANDARDS IN 2020

MUNI Route	Alternative A Peak Period	Alternative A Peak Hour	Alternative B Peak Period	Alternative B Peak Hour	Alternative N Peak Period	Alternative N Peak Hour
15-THIRD	+15%	+17%	+22%	+22%	+10%	+12%
30-STOCKTON	0	0	+6%	+6%	0	0
42-DOWNTOWN LOOP	NA	NA	NA	NA	+3%	0
47-VAN NESS	+50%	+56%	+75%	+83%	NA	NA
22-FILLMORE	0	+4%	0	+4%	NA	NA
MUNI METRO	0	0	0	+12%	0	0
81X-BATTERY-SANSOME	0	+12%	0	+12%	0	+8%

NOTE: These service increases would be required beyond the mitigated 2000 conditions.

SOURCE: Barton-Aschman Associates, Inc.

Measure	Alternative	Description
		Project Area in 2020, provide the following capacity increases shown in Table VI.E.30. These increases in service capacity, above the mitigated levels for 2000 (see Mitigation measure E.11), would enable the routes to meet MUNI's average load factor standard of 1.25 passengers per seat. Additional articulated buses could provide the required capacity for all bus routes, except the 47-VAN NESS. Between 2000 and 2020, ridership demand on the 47-VAN NESS would reach a level that would justify consideration of installing a light-rail route between the Project Area and Civic Center. Additional capacity on MUNI Metro would require the provision of additional light-rail vehicles.

Measure	Alternative	Description
Rail Freight		
E.33	A,B,N	In order to maintain freight rail access to the Northern Container Terminal south of the Project Area at Islais Creek, provide access by a different lead track from the Southern Pacific mainline northbound tracks to replace the 16th Street lead that would be removed by development of the Mission Bay Alternatives. There are a number of options that could be considered which could accomplish this:
E.33a		Reconstruction of the SP / Santa Fe Indiana track south to 25th Street. The 25th Street track connects to the Illinois Street track, which accesses the Northern Container Terminal. This option would result in a more circuitous route than the Army Street track.
E.33b		Construction of a new lead from under I-280 to the former Western Pacific track on Army Street, which reaches the Northern Container Terminal. Engineering and design considerations could include grade differences, and alignment of curves between existing I-280 supports.
E.33c		Construct new track south of the Project Area extending from the Quint Street lead via a new Islais Creek bridge crossing to the North Container Terminal. The bridge crossing would require a new drawbridge to meet federal clearance requirements over the Islais Creek Channel, a navigable waterway. This alternative would provide the most direct connection and would also permit linking up the North and South Terminals by rail, enabling more effective rail / maritime freight handling at the Port. It has been the subject of review by the Port of San Francisco as part of their Container Terminal modernization program.
		Although all of these measures would ensure continued rail freight service to the North Container Terminal, they differ in length, number of curves,

Measure	Alternative	Description
		and the nature and extent of added operations. Selection between these measures requires an evaluation of costs against the relatively small amount of rail freight shipments through the North Terminal.
Parking		
E.34	A,B	Some of the measures identified to mitigate parking impacts projected in 2000 would be less viable in 2020. Since the Project Area would be fully developed in 2020, there would no longer be vacant lots on which to provide interim parking. Without further mitigation, cumulative travel demand on the region's highway and transit network would create a major disincentive for travel by private automobile. Indeed, if parking demand were to reach the levels projected in the impact analysis, measures should focus on changing the habits of travelers during non-peak hours to use transit, or walk; the majority of travelers from the Downtown & Vicinity during the peak commute period are already assumed to make their trips by transit or ridesharing.
E.34a		Increase off-peak transit frequencies on MUNI, as well as regional transit systems serving San Francisco, and extend regional transit service into the Project Area. More frequent service and service extensions would make transit more convenient and therefore more attractive for use by not only travelers associated with Project Area development, but also in the rest of the Downtown & Vicinity. This measure would involve additional funding for the affected transit agencies.
E.34b		If additional off-street spaces were to be provided to mitigate the effects of excess parking demand in the Project Area, up to 1,690 off-street spaces would be required for Alternative A (about 1,400 of which would be

Measure	Alternative	Description
		associated with office use), and up to 700 spaces for Alternative B. These figures represent the upper limit of needed parking; they do not assume use of curbside parking. The resulting parking supply requirements by land use to offset the parking deficit are the same as those presented in parking mitigation measures for year 2000 (see measure E.14): 1.35 spaces per 1,000 square feet of office; 0.84 spaces per room for hotels; and 0.04 spaces per passenger for the CalTrain Station.
		Generally, on-street spaces that are metered for short-term periods serve retail uses well. Retail uses have the highest visitor volumes relative to other land uses proposed for the Project Area, thus generating the highest parking turnover and making most efficient use of curbside spaces.
		Provision of additional parking would likely require parking garage sites that could affect the location and configuration of other land uses. Additional parking resources could perpetuate the attraction of more intercept parking demand in the Project Area, and could result in localized circulation problems and congestion. Further, the provision of parking at the CalTrain station would not respond to existing Master Plan policies that encourage the use of local transit to reach regional transit systems in San Francisco.
E.34c		Mitigation measures recommending shared parking facilities and parking rates in year 2000 (see measures E.14c and E.14d) are also applicable in 2020.
E.34d		Do not provide parking at the MUNI Metro stations in the Project Area, and control the use of any parking that may be provided for CalTrain passengers.

Pedestrian/Bicycle

Mitigation measures identified for 2000 to address pedestrian and bicycle impacts would also apply in 2020 (see Mitigation measures E.16 and E.17).

Regional/Cumulative Measures for Consideration, Build-Out/2020

The cumulative transportation impact analysis found that most regional roadway and transit capacity serving San Francisco would become saturated by the year 2000, with available capacity essentially used up, except across the South Bay screenline. This condition is projected due to growth in the region's employment and population, with or without the Alternatives. Ultimate system operational capacity would be reached by the year 2000 on BART during the peak hour and the Golden Gate and Bay Bridges during (at least) a two hour PM peak period. To serve regional cumulative travel demand projected between 2000 and year 2020, additional capacity would be needed beyond the "reasonably assured" level defined for 2000.

The region's ability to add further capacity increments would be constrained by the nature of different transportation systems. For those systems that would be at their ultimate capacity in 2000, the needed increment of capacity would require the development of entirely new systems. For other systems, public policy issues need resolution to enable maximum use of existing or expanded capacity.

The transportation impact analysis in this EIR provides "snapshots" of the outbound evening commute travel demand in the years 2000 and 2020. Such an analysis can only suggest where planning and development must be undertaken to serve future regional transportation needs. The analysis in this EIR can therefore provide a starting point for regional planning for the year 2020.

In essence, by about the year 2000, most of the transportation systems planned to serve travel demand in the central part of the region through the 1960s and 1970s will have become saturated due to regional growth. The year 2020 represents an appropriate long-term planning horizon for transportation systems, which by nature require very long lead times for approval, funding, final design, right-of-way acquisition, environmental review and construction. Planning for new systems needed for the 2020 time horizon will have to begin soon, as such systems must be under development in the 1990's to be available to serve post-2000 demand.

The Bay Area is composed of many and diverse regional and local jurisdictions. These governmental entities have overlapping transportation functions and often act in conflicting ways. Nevertheless, there is a considerable degree of cooperative regional transportation planning in progress, ranging from 20-year highway and transit corridor studies, to short-range (five-year) plans for specific transit districts or services. However, formal planning has yet to begin for the purpose of evaluating the issues concerning some of the year 2020 cumulative mitigation measures suggested here: for example, new bridges, the expansion of existing bridges, exclusive HOV / busway networks, or the provision of a new Transbay transit tube.

Regional Highway and Transit Corridor – North Bay

Measure	Alternative	Description
E.35	A,B,N	To mitigate the cumulative traffic impacts of regional growth, including the EIR Alternatives, the City could initiate a cooperative planning program with the MTC, the Golden Gate Bridge, Highway and Transportation District, Marin County, Sonoma County, and Caltrans to determine the long term transit improvements that will provide additional transbay travel capacity. The two long-term alternatives discussed below would involve improvements beyond the scope of the current 101 Corridor Study (Phase II) underway.
E.35a		The first item, an exclusive bus/HOV lane across a second deck on the Golden Gate Bridge, would extend on U.S. 101 through Sonoma and Marin Counties from contraflow or conventional bus lanes on streets in San Francisco. The bus / HOV lane on U.S. 101 would require adding at least two lanes on a second deck of the bridge, and new HOV facilities between the Golden Gate Bridge and the Richardson Bay Bridge. Additional HOV facilities to extend through Marin County to Sonoma County would be required north of Novato; the reasonably assured capacity improvements already identified the need for HOV facilities between Richardson Bay and Novato (see p. VI.E.212). South of the Richardson Bay Bridge, a contraflow bus / HOV lane would require removing at least one mixed-flow lane from service in the off-peak direction. While this would reduce auto-carrying capacity, the LOS provided on this segment of the freeway would still be acceptable.

Measure	Alternative	Description
		A second deck would provide preferential treatment for buses and carpools across the Golden Gate Bridge, which would otherwise have no capacity to provide HOV facilities on its span. This measure is predicated on the assumption that conventional roadway lanes on San Francisco approaches to the Golden Gate Bridge would be converted to bus-only lanes in order to handle the large numbers of buses during the peak period; that mitigation measure was identified in 2000 (see measure E.19). Alternatively, a transit subway could be built in and to the downtown.
E.35b		Another possible measure would be a light rail line from the Larkspur ferry terminal south to San Francisco over a second deck of the Golden Gate Bridge. This would be an extension from light rail service on the Northwest Pacific Railroad right-of-way between Santa Rosa and the Larkspur Ferry terminal./3/ From the Larkspur terminal to the Golden Gate Bridge, the light rail line would require construction of elevated or subway tracks. Optimal service into San Francisco would require no transfers; one possible approach would be to coordinate a connection between the North Bay light rail route and light rail route serving the Geary Street Corridor in San Francisco. Such a connection would require consideration of routing, whether the tracks would be at grade, elevated or subterranean, as well as coordination between multiple transportation agencies. Both of these possible solutions involve constructing a second deck in order to provide a net addition of travel capacity to the North Bay, as there would be no opportunities to accomplish that within the existing bridge design.

Regional Highway and Transit Corridor - East Bay

Measure	Alternative	Description
E.36	A,B,N	To reduce the cumulative traffic impacts of regional growth, including the EIR Alternatives, the City should coordinate with MTC, Caltrans, and other affected agencies to increase Transbay travel capacity. Some possibilities are presented below:

Measure	Alternative	Description
E.36a		"Southern Crossing." During the 1950s, CalTrain proposed the construction of a bridge south of the San Francisco – Oakland Bay Bridge as a means of relieving anticipated congestion on the Bay Bridge. That proposed bridge would have extended from the Hunters Point area of San Francisco to near Alameda with a freeway connection to the Nimitz Freeway (I-880). In the early 1970s, this proposal was defeated by a referendum in San Francisco because of objections to accommodate more regional vehicle trips in San Francisco; the sentiment was that additional transbay freeway capacity should involve building another structure across the central part of the Bay. The concept of a Southern Crossing has not been formally studied in the last 15 years, so accurate information about costs and traffic operational implications is not available. However, it is possible to present the following as likely factors or effects of a new "Southern Crossing." The construction of the span and approaches would cost hundreds of millions of dollars. Bonds backed by toll revenues would need to be issued for construction funds to be generated. The financial feasibility of this proposal would depend on the ability to depend on either toll revenues only from the new bridge, or on total toll revenues collected from the new and existing bridges. Toll revenues from existing bridges are already used for a variety of purposes, including maintenance and operations, widening of existing bridges and transit operating support. From a political standpoint, a "Southern Crossing" may be more viable if the West Bay approach occurs at I-380 (north of San Francisco Airport). Part of the roadway approach already exists. However, as this is the widest part of the Bay, construction costs would be higher. The new bridge would reduce traffic congestion on the two adjacent bridges, with the amount of reduction dependent on how many of the travelers would have to pass through congested

Measure	Alternative	Description
		freeway segments to reach the new bridge. Additional freeway widenings of U.S. 101 in San Mateo County and I-880 in Alameda County could be required.
		To the extent that congestion is reduced on the Bay Bridge, the viability of vehicular travel to San Francisco from the East Bay would increase; conversely, transit and rideshare use could decrease. The extent to which this would occur would depend on the availability and cost of parking in San Francisco, the amount of congestion on the freeways heading to the Bay Bridge, and the amount of congestion on surface streets in San Francisco.
E.36b		Expand the Oakland Bay Bridge. Expansion of the Bay Bridge's capacity to accommodate additional vehicles could be achieved by physical or technological means. Physical means would potentially include adding lanes on the span; modifying the western (I-80) approach to provide more continuous lanes; modifying the Treasure Island and Yerba Buena Island ramps to improve operations of the outside lanes; modifying on- and off-ramps; and modifying the I-880/I-80/I-580 Distribution Structure to provide more travel lanes. Technological means would include providing electronic information signs on the approaches and span, and providing a vehicle guidance and control system on the approaches and span to increase throughput.
		The provision of additional lanes could result either in new general traffic lanes or bus / HOV lanes on the approaches and span. The amount of additional traffic using the expanded Bay Bridge would depend on the extent to which adjacent congested freeway segments (I-80 and U.S. 101), and on- and off-ramps could be re-designed to accommodate more vehicles. The capacity increases would be used most efficiently as HOV facilities.
E.36c		Expand the Hayward - San Mateo Bridge. This bridge was originally built with six lanes on the western section and four lanes on the eastern

Measure	Alternative	Description
		causeway section. Caltrans has considered widening the eastern section to provide six travel lanes on the entire span. Widening the Hayward - San Mateo Bridge would relieve some of the congestion on the Oakland Bay Bridge, particularly for persons traveling from Berkeley/Oakland/San Leandro to northern and central San Mateo County. The amount of travel time affected would depend on the difference in travel time between the path using the Hayward - San Mateo Bridge, and the path using the Oakland Bay Bridge. While widening the Hayward - San Mateo Bridge would tend to reduce travel time, the total travel time savings would depend on operating conditions on Route 92 between U.S. 101 and the bridge, and between I-880 and the bridge; both segments would require modifications or widening to provide six lanes to match capacity on the Bridge span.
E.36d		Increase BART computer capability to operate more trains. This would enable more efficient use of the existing BART network because if peak hour headways could be reduced by half from the existing 2.25 minutes, service during that period could be doubled. BART was originally envisioned as operating at higher average speeds and 90 second peak headways. It is possible that technological advances between 2000 and 2020 could enable a decrease in headways. The cost of producing a system with this capacity could be offset by increased passenger revenues.
E.36e		Construction of a second BART tube, using the same right-of-way through San Francisco. This would greatly increase BART's Transbay capacity. An adjacent BART tube would need to be built starting in Downtown Oakland (at the BART Wye), extending to the western end of the line if it were to be confined to the existing subway tunnel of the BART system. A different option would be to extend BART service to other service areas; possibilities within or through San Francisco are Geary Boulevard, or south to the San Francisco International Airport. The purpose of new

Measure	Alternative	Description
		transbay BART routes would be to serve new geographic markets, which could help reduce regional vehicle demand.
E.36f		Another option for expanded BART service would be the construction of a new Transbay tunnel for BART between Alameda and San Mateo Counties. New transbay service outside San Francisco could have a greater impact on reducing regional vehicle trips to the East Bay than a second San Francisco / Oakland transbay tube, such as that described above. Implementation of either of these concepts would involve major commitments of resources, and regional coordination. A BART expansion, if not aligned within the existing BART right-of-way, also would have to be planned in the larger context of linking with the existing rail network to maximize benefits to the entire region, as well as the immediate municipalities receiving new service.
E.36g		The provision of competitive transbay ferry services would require the deployment of high-speed high capacity boats and the construction of new terminals. Although the technology exists to provide the types of vessels that would make ferry service competitive in travel time and operating cost, planning the number, location and construction of new ferry terminals would involve coordination among local and regional transportation agencies. Issues concerning possible degradation to the Bay would also have to be evaluated to determine the viability of this concept.
Regional Transit - South Bay		
E.37	A,B,N	Between 2000 and 2020, the duration of highway congestion on U.S. 101 would justify the need to extend CalTrain service from Santa Clara and San Mateo Counties into downtown San Francisco. This measure received approval by San Mateo County voters in June 1988, when they approved a half-cent sales tax increase. That increase would generate $200 million toward the extension project, approximately one half the total estimated cost.

Measure	Alternative	Description
		The implication for Mission Bay of extending CalTrain service could be substantial depending on the location of its alignment. Preliminary route concepts evaluated by Caltrans extend through the western and northern edges of the Project Area. Even if such an alignment were installed underground, there could be substantial disruption to development and traffic circulation at the surface above. In addition, construction of this measure would disrupt or displace those land uses east and north of the Project Area that are located on the extension alignment.
		In addition to funding provided by San Mateo County, the extension would require funding by other parties, including MTC and the City and County of San Francisco.
E.38	A,B,N	If CalTrain is not extended into downtown San Francisco, another option for transit service to the South Bay would be possible via the extension of light rail service from San Francisco to the San Francisco International Airport and extending BART south into Santa Clara County. This measure would replace CalTrain service in San Francisco.
Downtown & Vicinity		
E.39	A,B,N	To reduce cumulative traffic impacts of growth in the Downtown & Vicinity, including the EIR Alternatives, increase transit capacity and service by 6% to 14% on the MUNI screenlines. Additional capacity could be provided by deploying more buses on existing or new routes, or by expanding light rail transit service across the Southeast, Northwest, and Northeast screenlines. The possible construction of a Geary Metro line would provide the needed capacity to the Northwest and Northeast screenlines, while the possible extension of a Bayshore Metro line would do so for the Southeast screenline.

NOTES

SETTING

/1/ Regional transportation facilities and services are those that serve more than one county directly. Project-level facilities provide direct accessibility to the Project Area, although they can also serve regional travel.

/2/ Manual turning movement counts were performed at 22 key intersections, and automatic machine counts were obtained for 32 street segments. Counts were conducted by Barton-Aschman Associates, Inc. on Tuesday-Thursday, October 22-24 and Wednesday, November 13, 1985. The count sheets are in the data binder on file at the Office of Environmental Review, Department of City Planning, 450 McAllister Street, San Francisco, CA 94102.

/3/ Transportation Research Board, Circular 212 Interim Materials on Highway Capacity, January 1980. Highway Research Board, Special Report 87, Highway Capacity Manual, 1965. A signalized intersection's LOS can be calculated by use of a number of methods. The City of San Francisco selected the Circular 212 Planning methodology as the long-range planning tool for projecting the LOS of signalized intersections. For unsignalized intersections, the 1985 Highway Capacity Manual methodology was used to evaluate the intersections' operation.

/4/ Numbers of bridge openings are based on data obtained from David Conci, Superintendent of Bridges and Tunnels, San Francisco Department of Public Works, Bureau of Street and Sewer Repair, May 1986. Data for the period of May 1985 to April 1986 were compiled and analyzed by Barton-Aschman Associates, Inc. and verified by David Conci.

Duration of bridge openings is based on a one-week sample survey conducted by the Superintendent of Bridges and Tunnels during May 1986.

/5/ Nearby freeway express service is available on MUNI routes 14X-MISSION EXPRESS, 17X-PARKMERCED EXPRESS, 9X-MARINA EXPRESS, 9AX, and 9BX. (In April 1986, the 30AX became the 9AX-SAN BRUNO "A" Express and the 30BX became the 9BX-SAN BRUNO "B" Express.) Those routes connect downtown San Francisco and southwestern and southeastern San Francisco via I-280 and U.S. 101, with stops approximately one mile north of the Mission Bay Project Area. Local service to areas adjacent to Mission Bay is provided by routes 19-POLK, 22-FILLMORE, 27-BRYANT, 48-QUINTARA/24th Street, and 53-SOUTHERN HEIGHTS.

/6/ Frequency is the description of the number of transit vehicles operated per hour past a point. Headway is the interval of time between buses, in minutes. MUNI Time Tables All Lines -- Spring/Summer 1986 is the information source for the description of service. The level of service provided by MUNI to the Project Area has not changed since then.

/7/ Counts taken by Barton-Aschman Associates, Inc. on Wednesday, November 13, 1985 and Thursday, May 22, 1986. Count sheets are included in the data binder available for public review at the Office of Environmental Review, Department of City Planning.

/8/ Briefing by Port of San Francisco staff (Dr. Randall Rossi, et al.) for Mission Bay EIR consultants, October 15, 1986.

/9/ Louise Anderson, Traffic Analyst, Port of San Francisco, telephone conversation, November 19, 1986. Maritime activity is measured using the term "berth-day" to describe the number of days that a ship is docked at a berth.

/10/ A Container Freight Station (CFS) is a building, such as a warehouse, where containers are opened and unpacked or repacked and transloaded to trucks before continuing on to their final destinations. At a CFS, cargo loads from a single origin can be broken up for trucking to a variety of destinations, and containers for a single destination can be packed with small shipments from a variety of origins.

/11/ The lease was initiated in 1950 in order for the Santa Fe to build and maintain a "new car ferry slip." Memorandum from Henry Williams, Assistant Commercial Property Manager, Port of San Francisco, August 26, 1986.

/12/ Port of San Francisco, San Francisco Container Terminal Modernization Final Environmental Impact Statement, January 23, 1986, pp. 70 through 74. Trip-generation rates used are 0.225 annual truck trips and 0.140 annual trips by other vehicles per annual ton of cargo shipped.

/13/ Port of San Francisco Southern Waterfront Improvements Traffic Study. Prepared by William Marconi for Port of San Francisco, September 29, 1985, pp. 11 to 14.

/14/ San Francisco Container Terminal EIS, op. cit., p. 70. References therein are from the FEIS Consultant's gate counts of the San Francisco South Terminal and the Marine Terminal Traffic Generation Manual prepared in 1980 as part of the Regional Seaport Plan by MTC and BCDC.

/15/ Based on estimates for this EIR by Recht Hausrath and Associates of total employment in 1985 on Piers 48 to 64, and trip generation rates from San Francisco Container Terminal EIS, op. cit.

/16/ In November 1985, the Western Pacific Railroad Company applied to the Interstate Commerce Commission for abandonment and discontinuance of service to San Francisco. The application was approved in 1986.

/17/ Lead tracks are defined as those tracks which extend beyond mainline tracks to serve local traffic.

/18/ Art Paige, Engineering and Operations Department, Southern Pacific Transportation Company, telephone conversation, April 13, 1988.

/19/ Southern Pacific Transportation Company, Southern Pacific Industrial Numbering System (SPINS) Directory, supplemented by Will Cogswell, Assistant Superintendent, Western Division, telephone conversation, August 25, 1986.

/20/ Atchison, Topeka and Santa Fe Railway Company, Santa Fe "CLIC" Book, pp. 18 and 20, supplemented by Steve Crook, Trainmaster, telephone conversations, August 25 and September 19, 1986.

/21/ The barge ferry operation on Pier 52 has not been active since about 1984, because of a fire at the Richmond terminus, and because barge ferry service is more costly to operate than rail service around the Bay.

/22/ Peter Rogers, Trainmaster -- Brisbane, Southern Pacific Transportation Company, telephone conversation, May 27, 1987.

/23/ Southern Pacific, which accounted for about three-fourths of all San Francisco carloadings, experienced a decline from 3,815 annual carloadings in 1983 to 2,873 in 1985 (a decrease of 25% in two years). Annual carloadings for Western Pacific, which accounted for almost one fourth of all San Francisco carloadings, declined from 1,950 in 1983 to 800 in 1985 (a decrease of 59% in two years). Annual carloadings for Santa Fe, which accounted for less than 1% of all 1985 carloadings in San Francisco, declined from 98 to 29 between 1983 and 1985 (a decrease of 70% in two years).

Trends for carloading volumes varied by geographic area served, partially reflecting trends indicated above for specific railroad companies. Within the Mission Bay Project Area, annual carloadings by the SP and ATSF railroads combined declined from 1,942 in 1983 to 1,174 in 1985 (a decrease of 40% in two years). Annual carloadings for the area north and west of the Mission Bay Project Area -- the area containing those rail shippers that could be affected by decisions made about trackage within the Mission Bay Project Area -- declined from 1,321 in 1983 to 1,084 in 1985 (a decrease of 18% in two years).

/24/ Memorandum from David Forgie, Triumph Marketing, to Dr. Randall Rossi, Port of San Francisco, August 27, 1986, pp. 1 and 2.

/25/ Metropolitan Transportation Commission, Market Evaluation and Projection (Task 1A -- Peninsula Freight Study), prepared by Triumph Marketing, December 5, 1986, pp. 5 - 6.

/26/ The flow categories are based on Pushkarev, B. and J. Zupan, Urban Space for Pedestrians, MIT Press, 1978, p. 79.

/27/ Precise counts were not possible for all street segments because the parking spaces were not clearly delineated; that is, marked by striping, signing or the location of parking meters. The number of parallel or 90-degree parking spaces available had to be estimated in some cases on the basis of the number of cars parked nearby in similar circumstances.

/28/ The midday survey was conducted by Barton-Aschman Associates on Wednesday, October 23, 1985. Detailed descriptions of the inventory of parking supply and the survey of parking demand for each street segment can be found in the data binder available for public review at the Office of Environmental Review, Department of City Planning, 450 McAllister Street, San Francisco, CA 94102.

/29/ The survey of off-street parking supply and demand was conducted by Barton-Aschman Associates on Thursday, October 24, 1985.

/30/ The magnitude of travel is described for the following modes: private vehicles on freeways and bridges; transit - MUNI, CalTrain, BART, SamTrans, AC Transit, Golden Gate Bus and Golden Gate Ferry; and other - jitneys, walking, bicycling, charter buses, or Red and White Fleet ferries, as appropriate for each screenline.

/31/ The derivation, calibration and application of the travel simulation model used in this analysis are described in Appendix E, pp. XIV.E.5-XIV.E.13.

/32/ Recht Hausrath and Associates (RHA) conducted sample surveys of employees in the C-3 District and the South of Market Area in 1982, while MTC conducted a sample survey of households in the nine-county region in 1981, the results of which were available in 1983. The RHA surveys provide data on where Downtown employees live, and the MTC survey provides data on all travel made by members of Bay Area households.

Responses to the sample surveys of downtown employees and to MTC's sample survey of households in the region were used to estimate percentages of each corridor's travel by mode, based on the information provided in the surveys for each of three trip purposes defined in the MTC Survey. After modal percentages were estimated for each trip purpose, for the p.m. peak hour and the p.m. peak period, they were added together. The total estimates of volumes by mode were then checked against the existing screenline counts of vehicles and transit passengers to determine if the correct factors had been used for the geographic distribution to corridors, the assignment of trips to screenlines, the assignment of trips to modes, and the amount of travel occurring by mode during the p.m. peak hour and p.m. peak period. The calibration was considered completed when the appropriate ratios of trips from the Downtown & Vicinity to total trips at the screenline were derived for each mode for the p.m. peak period and the p.m. peak hour (that is, when screenline trip estimates resulting from the calculations matched actual screenline counts). Appendix E contains the explanations of how the travel model, which consists of the geographic, modal, and peaking factors described above, was developed and calibrated to properly replicate 1985 travel characteristics.

/33/ Counts and other data used to describe demand and capacity for transit agencies serving San Francisco are included in the data binder available for public review at the Office of Environmental Review (OER), Department of City Planning (DCP), 450 McAllister Street, San Francisco, while the major components of the analysis methodology are described in Appendix E. Barton-Aschman Associates, Inc. prepared the estimates of travelers from the Greater Downtown.

/34/ Persons estimated to be traveling on MUNI routes (some of the listed MUNI lines do not serve the Project Area) are assigned to the following screenlines:

- Northeast - on MUNI routes 15, 19, 27, 30, 30X, 32, 41, 42, 45, 47, 49, 59, 60;
- Northwest - on MUNI routes 1, 1AX, 1BX, 2, 3, 4, 5, 21, 31, 31AX, 31BX, 38, 38L, 38AX, 38BX;
- Southwest - on MUNI routes 6, 7, 8, 13, 14, 14L, 14X, 16X, 17X, 26, 49, 66L, 71, 72X, J, K, L, M, N; and
- Southeast - on MUNI routes 9, 12, 15, 27, 30AX, 30BX, 47.

/35/ As is the case for the travel estimates presented here for all transit systems serving the Downtown & Vicinity, complete verification of these percentages is not possible. However, a review of MUNI's route structure and the calibration achieved between 1) travel factors derived from the surveys of downtown employees and 2) MUNI's peak-period and peak-hour counts for each screenline, show the percentages to be accurate estimates of travel.

/36/ On Saturdays, 24 trains arrive and depart from the San Francisco terminal, while on Sundays and holidays, 18 trains are scheduled.

Commuter rail service was initiated between San Francisco and San Jose in 1864, and the San Francisco terminal has been near the present site at least since 1914. In that year, the Southern Pacific Transportation Company built the present "Bayshore Cutoff" tracks through South San Francisco, Brisbane and eastern San Francisco, and established the terminal of the line at Third and Townsend Streets. In 1977, the Southern Pacific moved the San Francisco terminal from Third and Townsend Streets to its present location at Fourth and Townsend Streets.

/37/ Caltrans, Route Concept Report - Route I-80, Final, July 25, 1985, p. 5.

/38/ University of California, Institute for Transportation Studies, Bay Bridge Traffic Counts, Spring 1985.

/39/ Caltrans, Route Concept Report - Route I-80, pp. 5 and 9.

/40/ Source: Barton-Aschman Associates, Inc., Travel model for the Cumulative Study Area, described in Appendix E.

/41/ Caltrans, Route Concept Report -- Route 480, September 1986, p. 12.

/42/ Caltrans, Route Concept Report -- Route 1, Undated, p. 10.

/43/ Caltrans, Route Concept Report -- Route 101, March 1986, p. 14.

/44/ Caltrans, Route Concept Report -- Interstate 280, December 1985, p. 8.

/45/ Counts were conducted by Barton-Aschman Associates, Inc. on Tuesday, March 10 and Wednesday, March 11, 1987 on U.S. 101 and Wednesday, March 18 and Thursday, March 19, 1987 on I-280. Comparison of the counts to other counts taken in 1985 revealed increases in traffic of 5 to 10%.

/46/ Metropolitan Transportation Commission, Regional Transportation Plan for the Nine County San Francisco Bay Area, 1984 Edition, pp. 22-27.

/47/ Metropolitan Transportation Commission, Resolution 1876, March 24, 1988. The resolution expresses agreement between BART Counties and San Mateo County on a "buy-in" formula, funding and environmental analysis steps required for the CalTrain extension and the extension of BART to San Francisco International Airport.

/48/ The Transportation Element of the City's Master Plan contains the Mass Transit, Vehicular Circulation, Pedestrian Circulation, Bicycle, and Citywide Parking Plans, as well as the transportation section of the Downtown Plan. The Transportation Element of the (San Francisco) Master Plan was adopted in its present form in 1972, and amended in 1977 and 1982; City Planning Commission Resolutions 6834, April 27, 1972; 7642, January 20, 1977; and 9434, June 24, 1982. The Transportation Element was further amended on November 29, 1984, to incorporate the appropriate sections of the Downtown Plan.

/49/ San Francisco Board of Supervisors, Resolution No. 242-87, April 9, 1987, File No. 479-86.

/50/ Caltrans, CalTrain -- Peninsula Commute Service Five-Year Plan, 1986-1991, pp. 77 and 126.

/51/ San Francisco Municipal Railway, (Draft) Short-Range Transit Plan, 1987-1992, June 1987, pp. 89-90.

/52/ S.F. MUNI, (Draft) Short-Range Transit Plan, 1987-1992, op. cit., pp. 90-92.

/53/ S.F. MUNI, (Draft) Short-Range Transit Plan, 1987-1992, op. cit., p. 125.

/54/ San Francisco Department of City Planning, The Central Waterfront Plan, adopted by City Planning Commission Resolution 8631, July 3, 1980.

/55/ San Francisco Department of City Planning, Downtown Plan of the Master Plan, adopted by City Planning Commission Resolution, November 29, 1984.

/56/ Transit Preferential Streets are defined as important streets for transit operations where interference with transit vehicles by other traffic should be minimized. The designation of Transit Preferential Streets is based on criteria including transit service density (measured in transit vehicles and/or passengers per hour), and/or the existence of a traffic interference or conflict area. Townsend Street is also designated a Transit Preferential Street from Fourth Street (at the CalTrain terminal) to Second Street.

/57/ San Francisco Department of City Planning, Choices for Mission Bay --Planning Considerations (Draft), June 11, 1986, pp. 2-15.

IMPACT

/58/ In this analysis, the terms "region" or "regional" refer to the nine counties of San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Solano, Napa, Sonoma and Marin that constitute the geographic area included in the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission.

/59/ San Francisco Department of City Planning, CalTrain Station Locations, Special Study for Mission Bay, prepared by Barton-Aschman Associates, Inc., September 1986, p. 44.

/60/ Hill International, for Peninsula Corridor Study Joint Powers Board, Peninsula Commute Service Interim Upgrade Study, Part 1, Interim Upgrade Definition, September 15, 1987.

/61/ San Francisco Board of Supervisors, Resolution No. 242-87, March 30, 1987. The Board's action would preserve a potential right-of-way for extension of CalTrain into downtown, which at the time of the Board's decision did not have any funding commitment.

/62/ San Francisco Municipal Railway, Capital Improvement Program 1987-1992, June 1987, p. 74.

/63/ San Francisco Department of City Planning (Barton-Aschman), op. cit.

/64/ Lee Knight, Coordinator PUC Mission Bay Transit Planning, Memorandum to Bob Harrison, Chairman, City Agency Transportation Planning Committee, PUC/Muni Transit Service System Assumptions for 1985 and 2000 Supplementary to Memoranda Dated 6-23, 6-27 and 7-10, 1986, pp. 1-5 and attachments.

/65/ Light maintenance and overnight storage of Metro vehicles and streetcars would occur at MUNI's proposed Metro East facility.

/66/ San Francisco Department of City Planning, San Francisco Container Terminal Modernization, Final EIR (85.123E), pp. 15 and 17.

/67/ The train known as the Warm Springs Turn is assumed to continue to operate six days per week (Sunday through Friday) between the Bayshore, San Jose and Warm Springs (Fremont) Freight Yards. At the Warm Springs classification facility, connections with dedicated system-wide (intra-state or inter-state) train service would continue, with some rail traffic connections also being made at San Jose. (Industries between San Francisco and Burlingame are assumed to continue to be served by yard engines assigned to the Bayshore Yard.) Source: Triumph Marketing, for MTC, Peninsula Freight Study, Task 4: Comparative Cost and Operating Analysis, April 10, 1987, p. 6.

/68/ Daniel T. Smith, Principal, DKS Associates, letter to Jim Augustino, Santa Fe Pacific Realty Corporation, January 21, 1987, p. 1.

/69/ Persons traveling to or within San Francisco would experience highway congestion (and in some cases, transit congestion) during both a.m. and p.m. peak periods. Due to the combination of more trip purposes during the p.m. peak hour, however, p.m. peak hour would typically be higher than during the a.m. peak hour.

/70/ Work-related trips would be those trips made by persons traveling from their place of work directly to their place of residence, or trips made by persons traveling from their place of work to another place (or places) and then to their place of residence. The projections of employment and of places-of-residence (of future employees) used to create the forecasts of work-related travel are explained in VI.B., Land Use, Business Activity, and Employment, pp. VI.B.64.....

/71/ Those trips would be made by persons traveling between any origin and destination, excluding work places at either end of the trip. (As noted above, trips with a work place at either end of the trip are considered work-related trips.)

/72/ The ratios established by MTC between work-related and other travel were used to create these travel forecasts, with the magnitude of future travel based on the population and employment forecasts created for this EIR (see VI.B., Land Use, Business Activity and Employment, p. VI.B..., and VI.C., Housing and Population, p. VI.C...and VI.C.13).

/73/ The HOV facilities are also included in the analysis as "reasonably assured capacity" in 2000, which would be needed to precipitate the modal shifts that are projected.

/74/ Correspondence from Jerome M. Kuykendall, Director of Planning, Golden Gate Bridge, Highway and Transportation District, May 5, 1987. On file at the Department of City Planning, 450 McAllister Street, San Francisco.

/75/ Between 1985 and 2000, employment in the Downtown & Vicinity, including employment located in the Project Area, is projected to increase by 30% for Alternatives A and B and by 29% for Alternative N. Between 1985 and 2020, employment in the Downtown & Vicinity is projected to increase by 47% for Alternative A, by 43% for Alternative B, and by 46% for Alternative N. Between 2000 and 2020, employment in the Downtown & Vicinity would increase by 13% with Alternative A, 10% with Alternative B, and 13% with Alternative N.

/76/ The detailed travel forecasts for the Project Area and the Downtown & Vicinity used to create the cumulative travel forecasts described in this section are on file at the Department of City Planning, 450 McAllister Street, San Francisco.

/77/ This duration of congestion would be the result of conservatively projecting growth in vehicular travel but not in transit trips across the Bay Bridge from both the Downtown & Vicinity and the rest of the region during the p.m. hours adjacent to the peak two p.m. hours of travel (e.g., a 30% increase for travel from the Downtown & Vicinity, and a 38% increase for travel from the rest of the region, between 1985 and 2000).

/78/ The drop in the percentage of p.m.-peak-period vehicle trips from the Downtown & Vicinity reflects directly the effects of modal shifts; there is no assumption that there would be a smaller share of employees from the Downtown & Vicinity traveling during the p.m. peak period than the levels that occurred in 1985.

/79/ The regional travel forecasts for individual Alternatives would not be affected by the teardown of the I-280 freeway stub and by the construction of new on- and off-ramps at King and Sixth Streets, as all Alternatives would include those features.

/80/ CalTrain currently transports some 16,000 passengers on weekdays, 65% of whom board and/or alight at the San Francisco terminal station. Riders boarding CalTrain in San Francisco are for the most part commuting to and from work (80% of all riders surveyed in 1986 at the San Francisco terminal station indicated that they are traveling for work or business purposes). Almost 80% of these current riders travel to and from downtown locations north of Folsom Street and 55% to and from points north of Market Street. Only about 19% of all riders indicated that they get to the station directly by walking from their place of work, with almost all of the remaining riders transferring from MUNI buses.

/81/ The actual (numerical) travel forecasts created for the CalTrain Station Locations (Study) are not used in this EIR analysis, as they are based on similar assumptions about future transit service levels but different employment and population forecasts for the Downtown & Vicinity. However, the percent differences between the forecast of CalTrain ridership with the existing terminal and with the relocated terminal are used to present differences in travel that would be expected in the future.

/82/ Hill International, Peninsula Commute Service Interim Upgrade Study, Volume 1 Summary Report, October 31, 1987, pp. 1-14 and 1-15.

/83/ DKS Associates, "Patronage Effects of CalTrain Station Relocation," prepared for Santa Fe Pacific Realty Corporation, November 1986.

/84/ Robert Harrison, memorandum to Alec Bash, Department of City Planning, "Summary of Findings from Review of Alternative Patronage Projection for Caltrain," February 3, 1988, pp. 1-6.

/85/ That growth in BART ridership cannot be identified directly from the forecasts included in Tables VI.E.... and VI.E..... In those tables, the forecasts are of ridership on westbound BART trains at Civic Center Station, and include riders detraining within San Francisco.

/86/ San Francisco Municipal Railway, Short-Range Transit Plan 1987-1992, June 1987, p. 104.

/87/ The year 2020 forecasts incorporated the constraint that, with the Bay Bridge at capacity during the 4:00 to 6:00 p.m. period, travelers to or from the Downtown and Vicinity would shift to transit options and carpooling modes during those hours. As a result, the Downtown and Vicinity's vehicular volumes in the year 2000 would be the same as in 1985.

/88/ Caltrans, Highway Operations Branch, District 04, "1985 Transit Time and Speed Profile Charts." A summary of this information is on file at the San Francisco Department of City Planning, Office of Environmental Review, 450 McAllister Street, San Francisco 94102.

/89/ Metropolitan Transportation Commission, Year 2000 Travel Forecasts -- Trips by Mode and Network Assignments, Technical Summary, Fremont-South Bay Corridor and Pittsburg-Antioch Corridor Alternatives Analyses, July 1987, p. 17.

/90/ Barton-Aschman Associates, Inc., Travel Forecasts for Phase II Transportation Alternatives, 101 Corridor Study Phase II, October 1987, p. 17.

/91/ Metropolitan Transportation Commission, Final Report, I-80 Corridor Study, November 1987.

/92/ The amount of service required would depend on the load factor of each transit operator.

/93/ Northbound p.m. trips from the Project Area to the rest of the Downtown and Vicinity would not be in the peak direction of travel. Peak passenger loads would occur in the southbound direction because of travel from the rest of the Downtown and Vicinity to the CalTrain Station, and to housing in Mission Bay and Nearby Areas.

/94/ San Francisco Department of City Planning, Mission Bay Plan -- Proposal for Citizen Review, January 1987, pp. 5-38 to 5-40.

/95/ Triumph Marketing, for MTC, Peninsula Freight Study, Report on Rail Trends, June 1987, p. 8.

/96/ Triumph Marketing, op. cit., p. 17.

/97/ Triumph Marketing, op. cit., p. 14.

/98/ San Francisco Department of City Planning, San Francisco Container Terminal Modernization, Final EIR, op. cit., pp. 89-91.

/99/ San Francisco Department of City Planning, San Francisco Container Terminal Modernization FEIR, op. cit., pp. 11 and 17.

/100/ See ESA, Inc. and Wilbur Smith & Associates, Parking Demand Study: Park Hill Residential Project, December 22, 1982, where average parking demand was found to be 1.00 space per dwelling unit; and the Institute of Traffic Engineers, Parking Generation--Second Edition, 1987, where the average demand per dwelling unit for 60 surveys nationwide was 1.04, including suburban conditions. The 1980 Census found that the City-wide average vehicle ownership per dwelling unit was 0.94, with somewhat lower rates for comparable areas such as the Marina / Cow Hollow (0.90 vehicles per du.)

/101/ The residential parking demand ratio used in this analysis represents an overall average for all housing in Mission Bay. It is acknowledged that variation among individual households would result in some with more or less than one car per unit. Furthermore, variations in driver habits would result in use of curbside spaces by residents, regardless of the availability of off-street parking. Therefore, although the overall parking supply of housing is projected to meet overall demand, use of curbside spaces by residents would still be anticipated.

/102/ All calculations of curbside supply are estimates based on the schematic site plans, at a scale of 1"=800'. The estimates were based on an average of 30 linear feet of curb per parking space, which allows for driveways and other non-usable curb frontage.

/103/ The rate chosen for parking demand (0.84 spaces per room) was based on ITE surveys of ten suburban hotels (Land Use Code 321, 0.89/room), adjusted slightly downward to account for Mission Bay's urban influence. Institute of Transportation Engineers, Parking Generation, 2nd Edition, 1987.

/104/ California Department of Transportation, City and County of San Francisco, Metropolitan Transportation Commission, I-280 Transfer Concept Program Environmental Impact Report, Draft September 1984, p. III-47.

/105/ San Francisco Department of City Planning, Center City Circulation and Goods Movement, Working Papers 1, 2 and 3, and Final Report 1980.

/106/ Caltrans, CalTrain-Peninsula Commute Service, 5-Year Plan, 1987-1992, p. 77.

/107/ Ibid., pp. 180-192.

MITIGATION

/1/ Non-residential uses only. Parking supply for residential uses is assumed to be adequate for demand at a rate of one space per dwelling unit for all Alternatives and years. These calculations apply the parking supply rates shown in the mitigation to new Office, SLIRD and M-2 uses. For other uses, see the Appendix E. p. XIV.E.29. Gross area of 350 square feet per off-street parking space is used throughout.

/2/ Minimum clear sidewalk width is defined as the distance from the building line to the curb, if unobstructed, or to the nearest obstruction, such as a street tree, light pole, bus shelter, etc. A minimum 2.5 feet of clear sidewalk width is required for each person walking abreast of others. Since sidewalks are obstructed by street furniture of one type or another, this definition results in minimum overall sidewalk widths of seven and one-half feet or more. In high-density retail shopping areas, or streets near major transfer points, such as the CalTrain station or streets with MUNI Metro surface lines, overall sidewalk widths of 15 feet or more should be provided, allowing a group of three to pass a couple abreast in a clear width of 12.5 feet. Sidewalks of at least twelve feet in overall width should be provided on all retail commercial or office blocks and 7.5-8.0 feet in areas with low pedestrian traffic and a minimum of street furniture, such as residential and M-2.

/3/ For a description of the NW Pacific Railroad Project, see De Leuw, Cather and Co. for the County of Marin, "Northwestern Pacific Transitway Alternatives." Technical Memorandum No. 12, 101 Corridor Study, Phase II, October 21, 1987.

F. AIR QUALITY

SETTING

CLIMATE

Summer weather in the vicinity of the Project Area is dry, with mild temperatures and a lower incidence of fog than is found in most other parts of San Francisco. Winters are cool and moist. The predominant wind pattern is northwesterly and westerly winds from the Pacific Ocean. The marine layer typically extends from the ground surface to an elevation of 2,000 feet./1,2/ When the elevation of the marine layer is lower, ocean breezes enter San Francisco through the Golden Gate gap./3/ These maritime influences moderate summer and winter temperatures and, in general, reduce the air pollution potential in San Francisco.

Inversions occur occasionally over the Bay Area, reducing vertical dispersion of pollutants./4/ In the absence of winds to transport pollutants away from emission sources, inversions increase air pollution potential. Subsidence inversions in summer and fall limit vertical dispersion, often for extended periods and, together with strong sunlight, produce worst-case conditions for ozone generation. Surface inversions, characteristic of wintertime, radiational cooling at land surfaces, are generally of short duration, but they begin at or near the earth's surface, so emissions can accumulate near ground level. In general, the potential for air pollution problems in the Project Area is greatest during fall and winter, when winds are light and inversion heights are low, such as 1,500 feet.

AIR QUALITY

Air Quality Regulations and Standards

Federal and state air quality standards have been established for five major ambient air pollutants, primarily to protect human health and welfare. These pollutants are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM_{10}) (see Appendix F, Table XIV.F.1, p. XIV.F.1). Documented health effects from air pollution include acute respiratory infections, chronic bronchitis, chronic constrictive ventilatory disease, pulmonary emphysema, and bronchial asthma. For environmental impact analyses, estimated potential pollutant concentrations associated with a proposed project are compared with the most stringent federal or state standard./5/

Federal 1977 Clean Air Act Amendments, under the jurisdiction of the U.S. Environmental Protection Agency (EPA), require each state to identify areas within its borders that do not meet federal ambient air quality standards (termed "non-attainment areas"). The EPA has designated the San Francisco Bay Area Air Basin, which includes the Project Area, as a non-attainment area for O_3 and CO.

The EPA also has required each state to submit a State Implementation Plan (SIP), specifying strategies which will be used to attain federal ambient air quality standards by 1987. The California Air Resources Board (ARB) is the state agency responsible for submitting the SIP to the EPA.

The ARB classifies air basins or portions thereof as "attainment" or "non-attainment" with respect to the federal standards, based on air quality monitoring data collected by the ARB and regional Air Quality Management Districts. It establishes state ambient air quality standards and state emission standards for new vehicles that, in many cases, are more stringent than federal standards. In California, the more stringent of the federal and state standards applies; however, current air quality planning activities are focused on attaining federal ambient air quality standards.

The Bay Area Air Quality Management District (BAAQMD) has primary responsibility for the attainment and maintenance of air quality standards in the San Francisco Bay Area Air Basin./6/ It operates a network of community air quality monitoring stations that measure and record ambient (background) levels of O_3, CO, NO_2, SO_2, total suspended particulates (TSP), and PM_{10}. The closest air quality monitoring station is on Arkansas Street (near 16th Street), less than one mile from the Project Area. This station has been in operation since 1986./7/ A five-year summary (1982-1986) of air quality monitoring data collected for San Francisco is presented in Appendix F, Table XIV.F.2, p. XIV.F.2. The BAAQMD also operates a micro-scale monitoring station on Ellis Street between Franklin Street and Van Ness Avenue.

In 1982, the Association of Bay Area Governments (ABAG), BAAQMD and the Metropolitan Transportation Commission (MTC) developed the 1982 Bay Area Air Quality Plan for incorporation into the SIP./8,9/ The 1982 Plan set forth a time schedule for attainment of federal air quality standards for O_3 and CO by 1987. The 1987 deadline for attainment of the federal air quality standards has passed and the Bay Area remains in non-attainment of the federal O_3 and eight-hour average CO standards. Congress is considering additional amendments to the Clean Air Act to address those areas of the country that remain in non-attainment.

Regional and San Francisco Air Quality

Because it is located in a non-attainment area for O_3 and CO, mobile- and stationary-source emissions from the Project Area should be consistent with regional air quality objectives, particularly with attainment strategies for O_3 and CO described in the 1982 Plan. A description of the five major pollutants for which ambient air quality standards exist is presented below.

Ozone (O_3)

The most severe air quality problem in the San Francisco Bay region is O_3. O_3 is not emitted directly into the atmosphere, but is produced in the atmosphere through a complex series of photochemical reactions involving hydrocarbons (HC) and nitrogen oxides (NO_x), precursors of O_3, that are emitted primarily from motor vehicles, and residential and industrial fuel combustion processes. High levels of O_3 typically occur in the summer and autumn on warm, windless, sunny days with inversion heights of 1,500 feet or less.

Within the region, O_3 standards are violated most often in the Santa Clara, Livermore, and Diablo Valleys because local topography and meteorological conditions favor the build-up of O_3 and its precursors in those locales. Despite the more favorable meteorological and topographical conditions in San Francisco, high levels of O_3 occasionally occur. The state O_3 standard was last violated in San Francisco in the early afternoon in September 1983. Predominant winds push NO_x and HC emissions from San Francisco sources to the East Bay and South Bay, where they contribute to regional O_3 formation. High levels of ambient O_3 can cause eye, nose, and throat irritation; chest constriction; or severe coughing. Children and individuals with chronic lung disease typically are the most sensitive population groups to high ambient levels of O_3.

The 1982 Plan recommended that the most efficient way to reduce O_3 levels is to reduce HC emissions. The 1982 Plan projected that a reduction in HC emissions of 85 tons per day would result in attainment of the federal O_3 standard by 1987; however, region-wide attainment was not achieved by the end of 1987 as required by the Clean Air Act. The major contributing factor that prevented achievement of the federal O_3 standard was the simultaneous reduction of HC and NO_x. Given the ratio of HC to NO_x typical in the Bay Area, reduction of NO_x can actually increase O_3 levels, offsetting the benefit of reduced HC emissions. (Different HC to NO_x ratios show different sensitivities.) Other contributing factors were that the Inspection / Maintenance Program has not been as effective in reducing motor vehicle HC emissions as expected, and implementation of five of the 23 stationary source control measures outlined in the Plan was delayed.

O_3 levels can fluctuate widely from year to year because of their sensitivity to variations in weather. However, the overall trend for O_3 concentration levels in the region was downward in the 20 years prior to 1984./10/ Regional inventories by the BAAQMD project that HC emissions will begin to rise in 1990 after a 25-year period of decreasing emissions, which could prevent the Bay Area from ever attaining the federal O_3 standard.

Carbon Monoxide (CO)

CO is a non-reactive pollutant whose major source is motor vehicles. Persons with cardiorespiratory disease or anemia may be particularly susceptible to adverse effects from high ambient CO levels. These effects include impaired psychomotor abilities, impaired visual acuity, headaches, fatigue, drowsiness, and respiratory failure. CO emission levels have declined substantially over the last 25 years./11/ Regional emission inventories developed by the BAAQMD projected that this trend would end by 1987, and that thereafter, CO emissions would stay relatively constant until 2000.

Concentrations of CO generally occur in localized areas, or hot spots, such as congested intersections with comparatively high traffic volumes. Highest concentrations of CO typically occur on cold, windless nights from November through February (more than 80% of ambient standard violations in the Bay Area occur between November and January and 90% of these violations occur between 4:00 p.m. and 2:00 a.m.). Between 1982 and 1986, the eight-hour federal and state CO standard of nine parts per million (ppm) was violated once at the monitoring station in San Francisco nearest to Mission Bay (Potrero Hill). The maximum value was 9.1 ppm, recorded in October 1982 between 5:00 p.m. and 1:00 a.m.

The 1982 Bay Area Air Quality Plan recommended a CO control strategy for three specific areas -- San Jose, Oakland and Vallejo -- where the federal and state eight-hour standard most often had been violated. The 1982 Plan projected that, with existing vehicle emission control programs, the remaining portions of the Bay Area, including San Francisco, would not experience CO violations.

Hot-Spot Monitoring. CO is known as a localized air pollutant, with the highest levels in proximity to heavily traveled roads and intersections. In general, permanent BAAQMD stations are not located near major intersections, so CO monitoring data from these stations are more representative of ambient, or background, CO levels.

To determine local CO conditions, the BAAQMD conducted two hot-spot monitoring programs at heavily traveled locations in several parts of the Bay Area, including San Francisco County./12,13/ In San Francisco, one of the hot-spot locations where CO levels were monitored by the BAAQMD during the winter of 1979-80 was the intersection of Washington and Battery Streets. The high eight-hour average concentration was 10.1 ppm, which violates the state and federal standards by 1.1 ppm. The high one-hour average concentration of 15 ppm does not violate the 20-ppm state standard or the 35-ppm federal standard.

Another CO monitoring program was conducted during the winter of 1980-81 at the intersection of Geary and Taylor Streets, and at 100 Harrison Street at Spear Street. At Geary and Taylor, the observed high eight-hour average concentration was 11.5 ppm, which violates the standards by 2.5 ppm, and the high one-hour concentration was 15 ppm, which does not violate standards. At Harrison Street, the observed high eight-hour and one-hour average concentrations were 7.8 ppm and 13 ppm, respectively, which do not violate standards.

In December 1985, hot-spot CO monitoring was conducted for this EIR at the intersection of Sixth and Brannan Streets. The purpose of the monitoring was to measure peak CO concentrations at Sixth and Brannan Streets, and to compare these concentrations with traffic counts at the intersection and with monitoring data from BAAQMD's Potrero Hill station, approximately 1.5 miles south-southeast of the Sixth and Brannan Streets intersection. That intersection was selected for hot-spot CO monitoring because it currently experiences the highest traffic volumes of all identified critical intersections for the proposed project./14,15/ There were no violations of CO standards.

Total Suspended Particulate (TSP) and Respirable Particulate (PM_{10})

The most important sources of total suspended particulate (TSP) in San Francisco are fugitive emissions (dust) from demolition and construction activities, and from motor vehicles traveling over paved roads. BAAQMD regional projections indicate that TSP emissions would increase by about 33% between 1982 and 2000, following a downward trend for the 25-year period prior to 1982./11/

State standards for particulate matter changed in 1983 and federal standards changed in 1987 to concentrate on fine particulate matter (PM_{10}) which has been demonstrated to have health implications when inhaled. Correlations have been observed between increases in PM_{10} concentrations and the incidence of upper respiratory infections, cardiac diseases, bronchitis, asthma, pneumonia, and emphysema. Actual monitoring for PM_{10} did not begin in San Francisco until April 1986, so only particulate data collected under the previous TSP standards are considered in this EIR.

The federal standard of 150 ug/m^3 of TSP for a 24-hour average has been replaced by a standard of 150 ug/m^3 of PM_{10} for a 24-hour period and 50 ug/m^3 annual average. The former standard, in effect until 1987, was violated occasionally in various locations in the Bay Area, including San Francisco. The BAAQMD's Potrero Hill monitoring station recorded maximum 24-hour average TSP concentrations of 152 ug/m^3 in 1984, 158 ug/m^3 in 1985, and 124 ug/m^3 in 1986.

A portion of the suspended particulates in the air is lead; the state and federal governments both have established a separate standard for lead (see Appendix F., Table XIV.F.1, p. XIV.F.1). Motor vehicles using leaded fuels are the major source of lead emissions in the Bay Area, accounting for 98% of the ambient lead. Since 1978, lead levels have decreased due to the phasing-out of motor vehicles using leaded fuel. No violations of the state or federal lead standards have been recorded in San Francisco since 1978, and none are anticipated in the future. Because of the negligible potential for adverse impacts on future air quality from ambient lead concentrations, lead will not be discussed further in this analysis.

Nitrogen Oxides (NO_x)

Nitrogen oxides (NO_x), which consist of nitric oxide (NO) and nitrogen dioxide (NO_2), contribute to the formation of O_3. NO is released by stationary and mobile sources and tends to oxidize in the air to NO_2. NO_2 is highly reactive in the presence of sunlight, and combines with reactive hydrocarbons to form photochemical smog, of which the major constituent is O_3. NO_2 acts as an irritant and has been correlated with respiratory diseases in sensitive population groups.

The major sources of NO_x in the San Francisco Bay region are vehicular, residential and industrial fuel combustion. Emissions of NO_x have decreased in the Bay Area since 1978 because of a drop in fuel consumption, vehicle emission control programs, and lower emission rates for diesel construction equipment and fuel combustion categories./11/ Federal and state standards for NO_2 have not been violated in the Bay Area since 1980. NO_x emissions were projected by the BAAQMD to stay constant until 1990, and then to follow a rising trend -- increasing about 15% between 1990 and 2000./8/

Sulfur Dioxide (SO_2)

The major sources of sulfur dioxide (SO_2) emissions in the Bay Area are petroleum refining and combustion of diesel fuels by ships, trucks, and buses.

According to BAAQMD emission inventories, regional SO_2 emissions followed a decreasing trend from 1974 until 1982, when they began to rise. While the maximum 24-hour SO_2 concentrations measured in San Francisco increased from 1982 to 1985 -- 0.012 ppm in 1981 to 0.028 ppm in 1986 - state and federal standards (0.05 ppm and 0.14 ppm, respectively) have not been violated in over a decade. The reasons for that rise in SO_2 readings have not been identified./16/

Regional SO_2 emissions are projected by the BAAQMD to double in the period between 1987 and 2000 due, in part, to a projected switch from natural gas to oil for generation of electricity.

Project Area Emissions

The Mission Bay Project Area contributed about 15,900 trips per day to regional vehicle travel in 1985, constituting less than 3% of San Francisco County emissions./17/ Emissions of HC, NO_x, CO, TSP, and SO_2 are estimated based on the information contained in Appendix F., Table XIV.F.3, p. XIV.F.3, and compared with county-wide emission levels, as shown in Table VI.F.1. Emissions from industrial sources in the Project Area and vicinity are identified in Appendix F, Table XIV.F.3, p. XIV.F.3. Major

TABLE VI.F.1: PROJECT AREA AND COUNTY EMISSIONS, 1985 (Tons per Day)

Pollutant	Emissions Mission Bay/a/	Emissions 1985 San Francisco/b/	Mission Bay Contribution to County Emissions (%)
Carbon monoxide	6.70	230	2.90%
Hydrocarbons	0.44	53	0.83%
Nitrogen oxides	0.47	40	1.20%
Sulfur dioxide	0.040	13	0.31%
Total suspended particulate /c/	0.46	71	0.65%

/a/ Traffic emissions only; building emissions are assumed to be negligible. Assumes an average speed of 25 miles per hour and composite vehicle emission factors from BAAQMD, Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans, November 1985. These composite vehicle emission factors were revised in April 1988 to reflect EMFAC7D emission factors developed by California Air Resources Board.

/b/ San Francisco County emissions for 1985 were estimated using BAAQMD emission inventories contained in Emissions Inventory Summary Report, August 1987.

/c/ Includes dust disturbed from roads.

SOURCE: Baseline Environmental Consulting, Inc. and Environmental Science Associates, Inc.

sources in the Project Area include a train terminal, private bus yards, a coffee-roasting firm, and two concrete plants where concrete is produced from cement and aggregate for packaging or transport. Ship repair firms adjacent to the Project Area on the east are also major industrial sources.

Commercial and industrial activities in the Project Area and vicinity generate emissions of NO_x and CO from combustion of natural gas for space-heating and industrial processes (such as boilers). Emissions from industrial processes are negligible compared to motor vehicle emissions./18/ Space-heating emissions for the downtown San Francisco area were estimated to contribute less than 3% of total emissions from the area./19/ Existing land uses in the Project Area would, by comparison, generate negligible NO_x and CO emissions from space heating.

PG&E's oil-fired power plants generate electricity for use in existing buildings in the Project Area and for electrically-powered public transit systems serving the Project Area, emitting criteria pollutants (SO_2, NO_2, TSP, CO, and HC, in decreasing order by weight). Some of those plants are located within the Bay Area Air Basin, in San Francisco, Solano and Contra Costa Counties. Emissions from the plants related to consumption of electricity in the Project Area contribute to current air quality violations in the Air Basin.

Project Area Carbon Monoxide Levels

Eight intersections in the project vicinity, listed in Table VI.F.2, were selected for this analysis because they have the potential to experience high ambient CO concentrations (see Appendix F., Figure XIV.F.1, p. XIV.F.4). These intersections currently experience, or

TABLE VI.F.2: WORST-CASE CARBON MONOXIDE CONCENTRATIONS AT SELECTED INTERSECTIONS, 1985 (Parts per Million)

	CO Concentration	
Intersection/a/	Eight-Hour Average/b/	One-Hour Average/c/
1. Second and Bryant Streets	7.9	11.3
2. Fifth and Bryant Streets	8.7	12.4
3. Sixth and Brannan Streets	13.4	19.1
4. First and Harrison Streets	8.1	11.6
5. Third and Berry Streets	9.2	13.1
6. Third and Fourth Streets	8.2	11.7
7. Third and Sixteenth Streets	8.2	11.7
8. Mariposa Street and Pennsylvania Avenue	7.7	11.0

/a/ Intersection locations are shown in Appendix F, Air Quality, Figure XIV.F.1, p. XIV.F.4.

/b/ The concentrations are computed by a modified version of the Modified Linear Rollback Model described in Appendix F, p. XIV.F.5. The concentrations are the sum of a background component, which reflects the ambient concentration levels, and the local component, which reflects vehicular traffic emissions at the intersection. Underlined values are in excess of the applicable standard (9.0 ppm for eight-hour average; 20.0 ppm for one-hour average). ARB-derived emission factors, version EMFAC7D, were used. Concentrations above the applicable standard are underlined.

/c/ One-hour concentration = eight-hour concentration divided by 0.7.

SOURCE: Baseline Environmental Consulting.

are projected to experience, the most congested traffic conditions in the project vicinity; these conditions are, or would be, generated primarily by travel from the Downtown & Vicinity. The air quality analysis is based on traffic data discussed in VI.E. Transportation, p. VI.E.11-VI.E.13 and worst-case meteorological assumptions for 1985. Calculated CO concentrations exceed the federal and state eight-hour CO standards at the Sixth and Brannan Streets intersection and the Third and Berry Streets intersection. Calculated CO levels did not exceed the one-hour (state) standard at any of these intersections. The methodology used to estimate CO levels at these eight intersections is described in Appendix F., beginning on p. XIV.F.5.

IMPACT

This section identifies the sources of air pollutant emissions associated with the construction and operational phases of the Alternatives. The effects of those emissions on local and regional air quality are then examined to determine the potential for a significant impact, the identification of which would trigger a requirement for adequate measures to mitigate the impact. For the operational phase, effects of the Alternatives on air quality are estimated for the interim analysis year, 2000, and build-out in about 2020. Since county-wide emissions inventories for years beyond 2000 have not yet been developed, effects on regional air quality in 2020 are described on the basis of year 2000 county-wide emissions inventories.

DEMOLITION, EXCAVATION, AND CONSTRUCTION EMISSIONS

During site development under all Alternatives, local air quality would be affected by emissions of NO_x, CO, SO_2, HC, and particulate matter (PM), including fugitive dust. Demolition, excavation, and construction activities would generate fugitive dust. Diesel-powered construction equipment would emit NO_x, CO, SO_2, HC, and PM. Architectural coatings, particularly solvent-based coatings for structural surfaces such as steel beams and wood exterior surfaces, would emit HC. With the exception of fugitive dust, the short-term contribution of pollutant emissions from site development activities would not be significant.

Fugitive Dust

The impact on air quality of fugitive dust generated by construction activities for all Alternatives would depend on the quantity and drift potential of the dust particles emitted. Larger dust particles (for example, over 100 micrometers, or microns, in diameter,) would tend to settle closer to the source than fine particles (less than 10 microns in diameter, PM_{10}). The dispersion distances and patterns would depend on local wind conditions, soil type, and moisture content./20/

Dust generated by demolition, excavation, construction activities, and wind erosion of exposed soil surfaces would contain substantial quantities of PM_{10}. According to the ARB, 64% of particles from road and building construction are PM_{10}./21/ Emissions of dust during site development under all Alternatives are anticipated to result in local PM_{10}

concentrations in violation of state and federal standards and, therefore, would require mitigation.

Toxic Air Contaminants

Fugitive dust generated for all Alternatives during ongoing demolition, excavation, and construction in former industrial and fill areas may contain toxic constituents. Past land uses in the Project Area that may have introduced toxic substances into the surface and subsurface soils, structures, or on-site debris are discussed in VI.N. Hazardous Wastes, beginning on p. VI.N.9. Short-term health impacts could result from inhalation of airborne contaminants, particularly by construction workers. Airborne toxic substances could also result in exposure through skin contact or ingestion of dust. Potential adverse health effects are also discussed on pp. VI.N.32.

Gaseous pollutants may be emitted during construction in former fill areas from disturbance of subsurface soils, and could affect health and safety of construction workers. Gases consisting primarily of methane and carbon dioxide may have been generated by biodegradation of fill materials. Methane is a fire and explosion hazard and an asphyxiant in concentrations greater than 5% of air; carbon dioxide is also an asphyxiant in high concentrations. During construction, gases that are heavier than air may accumulate in excavated trenches and pose hazardous working conditions. The Mitigation Program addresses potential hazards to construction workers and early occupants of the project from such gases.

Odors

Under all Alternatives, odors may be generated during the course of site development in former landfill areas and Bay muds. Localized odors would be detectable around excavation areas, and temporarily would affect primarily construction workers and Project Area occupants. Temporary annoyance would be the only anticipated effect.

BUILDING EMISSIONS

Combustion of natural gas for space-heating would generate primarily emissions of NO_x./20/ Other pollutants generated would include CO, HC, SO_2 and PM_{10} Space-heating emissions of NO_x would constitute less than 10% of total Project-Area emissions (i.e., space-heating and motor vehicle emissions) of NO_x. Space-heating emissions of CO, HC, SO_2, and PM_{10} would be much less than 10% of total Project-Area emissions of these pollutants. Thus, space-heating emissions should be negligible compared to motor vehicle emissions and will not be considered further in this analysis.

MOTOR VEHICLE EMISSIONS

Vehicular traffic from the Project Area would emit HC, NO_x CO, SO_2, and PM_{10}. The net increase in vehicular emissions associated with development in the Project Area has been estimated and is summarized in Table VI.F.3 for each Alternative for the years 2000 and 2020. These estimates consist of just the emissions from vehicle miles traveled within San Francisco County. Existing vehicular emissions released within San Francisco County have been subtracted from total Project Area emissions to show the project increment for each Alternative.

This net increase in emissions for the Project Area by 2000 is compared with San Francisco County transportation-related emissions for 2000. Project Area emissions in 2020 are also compared with year 2000 San Francisco County emissions. Emissions inventories beyond 2000 are not available./22/ Motor vehicle emissions would affect air quality at both the regional and the local level. Emissions would contribute to ambient concentrations of pollutants which could occasionally violate air quality standards. The primary air quality concern at the regional level would be the Project Area's contribution to regional ozone concentrations. The primary air quality concern at the local level would be the Project Area's contribution to ambient CO concentrations at congested urban intersections in its vicinity.

The human health effects from emissions under all Alternatives cannot be identified based on emissions projections. Human health effects from an air pollutant are a function of the physical condition of those exposed and the ambient concentration, which in turn depends on source emission rates (the project is only one source) and local meteorology, to name a few factors. The primary method of determining the effect of air pollution on human health has been to monitor ambient air concentrations of the five criteria pollutants and to compare these monitored concentrations with federal air quality standards established to protect human health. It is not possible to identify precisely the health effects resulting from Mission Bay-related emissions, although compliance with the standards implies that there would be no substantial health risk for the general public.

TABLE VI.F.3: NET INCREASE IN VEHICULAR EMISSIONS WITHIN SAN FRANCISCO COUNTY FOR THE PROJECT AREA, BY ALTERNATIVE, 2000 AND BUILD-OUT/2020 (Tons Per Day)/a/

	2000						2020					
	Alternative A		Alternative B		Alternative N		Alternative A		Alternative B		Alternative N	
Pollutant	Emissions (tpd)	% of County/b/	Emissions (tpd)	% of County/b/	Emissions (tpd)	% of County/b/	Emissions (tpd)	% of County/b/	Emissions (tpd)	% of County/b/	Emissions (tpd)	% of County/b/
CO	5.6	3.6%	1.8	1.2%	2.3	1.5%	15.0	9.6%	8.5	5.4%	9.6	6.2%
HC	0.17	0.74%	0.0	0.0%	0.02	0.09%	0.57	2.5%	0.30	1.3%	0.33	1.4%
NO_x	0.29	1.5%	0.08	0.4%	0.10	0.50%	0.85	4.3%	0.46	2.3%	0.53	2.7%
SO_2	0.05	0.33%	0.02	0.13%	0.02	0.13%	0.13	0.87%	0.07	0.47%	0.08	0.53%
PM_{10}/c/	0.27	/d/	0.11	/d/	0.13	/d/	0.78	/d/	0.37	/d/	0.44	/d/

---

tpd - tons per day

/a/ Vehicular emissions are based on BAAQMD emission factors derived from ARB EMFAC7D emission factors, an assumed average speed of 15 miles per hour, and an assumed three minutes of idling time per trip. Only vehicle miles traveled within San Francisco County are included in these emissions estimates.

/b/ Percent of transportation-related emissions for San Francisco County are based on the year 2000 regional transportation emissions inventory which was used to adjust the 1983 transportation-related emissions inventory for San Francisco County, contained in BAAQMD Emissions Inventory Summary Report, August 1987.

/c/ The PM_{10} emission factor is assumed to be 1.07 grams per mile. It is based on the assumption that approximately 98% of TSP vehicle emissions and 39% of dust disturbed from paved roads are PM_{10} (0.3 g TSP/mile x 0.975 = 0.29; 2 g disturbed dust/mile x 0.39 = 0.78; 0.29 + 0.78 = 1.07 g PM_{10}/mile) (Source: 1987 ARB Draft Emission Inventory).

/d/ Inventories of PM_{10} emissions have not yet been developed by the BAAQMD.

SOURCE: Baseline Environmental Consulting, Inc. and Environmental Science Associates, Inc.

Regional Air Quality

Bay Area Air Quality Management District (BAAQMD) guidelines set forth significance thresholds for assessing the air quality impacts of project-related emissions./17/ For projects whose emissions are predominantly associated with motor vehicle trips, those guidelines recommend that project emissions be compared with county-wide transportation-related emissions. If a project would generate a net increase in emissions amounting to greater than 1% of county-wide (transportation-related) emissions, then it would be considered to have a significant effect on air quality. A determination of significant effect on air quality on the basis of this 1% threshold criteria does not mean necessarily that a project's emissions would cause, or contribute measurably to, excesses of ambient air quality standards. Rather, the purpose of the 1% criteria is to identify those projects which would cause a substantial change in area-wide emissions. Land use and transportation measures to reduce emissions from such projects should then be seriously considered by local governments. These assessment guidelines and the results of emission calculations shown in Table VI.F.3, p. VI.F.14, will form the basis for the impact discussion that follows. Only those emissions that would occur in San Francisco County have been included in the estimate of net increase.

2000

Alternative A. Emissions associated with motor vehicle traffic generated by land use development in the Project Area under Alternative A would be about 19 tons per day of CO, 0.84 tons per day of HC, 1.1 tons per day at NO_x, 0.16 tons per day of SO_2 and 0.82 tons per day at PM_{10}. As shown in Table VI.F.3, Project Area emissions of CO and NO_x under Alternative A would exceed the 1% threshold of significance. Thus, Alternative A emissions would significantly increase county-wide emissions of those two pollutants, which is a significant effect. Alternative A emissions would be about 80% greater than Alternative B emissions and about 60% greater than Alternative N emissions.

Alternative B. Emissions associated with motor vehicle traffic generated by development in the Project Area under Alternative B would be about 11 tons per day of CO, 0.45 tons per day of HC, 0.65 tons per day of NO_x, 0.09 tons per day of SO_2, and 0.45 tons per day of PM_{10}. As shown in Table VI.F.3, pollutant emissions under Alternative B would exceed the 1% threshold for CO and, thus, would significantly increase county-wide emissions of that pollutant. Unlike Alternative A, motor vehicle emissions of NO_x would not be significant. Alternative B emissions would be about 60% of Alternative A emissions and about 90% of Alternative N emissions.

Alternative N. Emissions associated with motor vehicle traffic generated by development in the Project Area under Alternative N would be about 12 tons per day of CO, 0.51 tons per day of HC, 0.72 tons per day of NO_x, 0.09 tons per day of SO_2, and 0.51 tons per day of PM_{10}. As shown in Table VI.F.3, pollutant emissions of CO would exceed the 1% threshold of significance. Emissions under this Alternative would significantly increase County-wide emissions of CO and would be a significant effect. Unlike Alternative A, emissions of NO_x under this Alternative would not be significant. Alternative N emissions would be about 60% of Alternative A emissions and about 10% greater than Alternative B emissions.

Build-Out/2020

Alternative A. Emissions associated with motor vehicle traffic generated by development in the Project Area under Alternative A would be about 42 tons per day of CO, 1.8 tons per day of HC, 2.4 tons per day of NO_x, 0.34 tons per day of SO_2, and 1.8 tons per day of PM_{10}. As shown in Table VI.F.3, Project Area emissions of CO, HC, and NO_x under Alternative A would greatly exceed the 1% threshold of significance which indicates a significant change in County-wide emissions of these pollutants. Project emissions of CO, HC, and NO_x would be a significant effect under Alternative A in 2020. Alternative A emissions would be about 60% greater than Alternative B emissions and about 40% greater than Alternative N emissions.

Alternative B. Emissions associated with motor vehicle traffic generated by development in the Project Area under Alternative B would be about 25 tons per day of CO, 1.1 tons per day of HC, 1.5 tons per day of NO_x, 0.20 tons per day of SO_2, and 1.1 tons per day of PM_{10}. As shown in Table VI.F.3, Project Area emissions of CO, HC, and NO_x under Alternative B would greatly exceed the 1% threshold of significance which indicates a significant change in County-wide emissions of these pollutants. Project emissions of CO, HC, and NO_x would be a significant effect under Alternative B by 2020. Alternative B emissions would be about 60% of Alternative A emissions and about 80% of Alternative N emissions.

Alternative N. Emissions associated with motor vehicle traffic generated by development in the Project Area under Alternative N would be about 30 tons per day of CO, 1.3 tons per day of HC, 1.8 tons per day of NO_x, 0.24 tons per day of SO_2, and 1.3 tons per day of PM_{10}. As shown in Table VI.F.3, Project Area emissions of CO, HC, and NO_x under Alternative N would greatly exceed the 1% threshold of significance which indicates a significant change in County-wide emissions of these pollutants. Project emissions of CO, HC, and NO_x would be a significant effect under Alternative N by 2020. Alternative N emissions would be about 70% of Alternative A emissions and about 20% greater than Alternative B emissions.

Local Air Quality

For each of the Alternatives, Project Area-related vehicular emissions of CO are estimated for eight selected intersections using methodology described in Appendix F, beginning on p. XIV.F.5. Estimated CO concentrations are presented in Table VI.F.4. CO concentrations generally would be expected to improve throughout the region due primarily to the continuing introduction into the vehicle fleet of new vehicles equipped with better emission controls. There would be no violations of federal or state standards at the selected intersections.

However, the CO level estimates shown in Table VI.F.4 are based on traffic estimates that assume a modal shift from autos to transit by workers in the Downtown & Vicinity. If a shift of the degree assumed for this report did not occur, the result would be a lengthening of the peak period with a corresponding adverse effect on eight-hour average CO levels, especially near freeways and freeway ramps.

2000

Alternative A. CO concentrations at critical intersections in the vicinity of the Project Area would decrease from 1985 levels. No excesses of the state or federal ambient CO concentrations are anticipated. The intersection of Sixth and Brannan Streets would continue to experience the highest CO concentrations of the eight intersections analyzed. Estimated future CO concentrations reflect cumulative traffic conditions projected for the vicinity. The selected intersections currently operate at capacity, and would continue to do so in the future. Additional traffic generated by any of the Alternatives would not further impair traffic flow patterns at those intersections in a measurable way.

Alternative B. CO concentrations in 2000 at the selected intersections analyzed would be comparable to those identified for Alternative A.

TABLE VI.F.4: ESTIMATED WORST-CASE CARBON MONOXIDE CONCENTRATIONS AT SELECTED INTERSECTIONS, BY ALTERNATIVE, 1985, 2000, AND BUILD-OUT/2020/a/ (Parts per Million)

		CO Concentration by Alternative (ppm)						
		1985	2000			2020		
			Alternative			Alternative		
Intersection	Averaging Period		A	B	N	A	B	N
1. Second/Bryant Streets	8-hr.	7.9	5.5	5.5	5.5	5.5	5.5	5.5
	1-hr.	11.3	7.8	7.8	7.8	7.9	7.9	7.9
2. Fifth/Bryant Streets	8-hr.	8.7	5.9	5.9	5.9	5.9	5.9	5.9
	1-hr.	12.4	8.4	8.4	8.4	8.5	8.5	8.4
3. Sixth/Brannan Streets	8-hr.	13.4	6.9	6.9	7.0	7.0	7.0	7.1
	1-hr.	19.1	9.9	9.9	10.0	10.0	10.0	10.1
4. First/Harrison Streets	8-hr.	8.1	5.6	5.6	5.6	5.6	5.6	5.6
	1-hr.	11.6	7.9	7.9	7.9	8.0	8.0	8.0
5. Third/Berry Streets	8-hr.	9.2	5.4	5.4	5.4	5.5	5.5	5.5
	1-hr.	13.1	7.7	7.7	7.7	7.9	7.8	7.8
6. Third/Fourth Streets	8-hr.	8.2	5.5	5.5	5.5	5.6	5.5	5.5
	1-hr.	11.7	7.9	7.8	7.9	7.9	7.9	7.9
7. Third/16th Streets	8-hr.	8.2	5.5	5.5	5.5	5.6	5.5	5.6
	1-hr.	11.7	7.9	7.9	7.9	8.0	7.9	7.9
8. Mariposa Street/ I-280 On-Ramp	8-hr.	7.7	5.4	5.4	5.4	5.4	5.4	5.4
	1-hr.	11.0	7.7	7.7	7.7	7.7	7.7	7.7

/a/ The tabulated concentrations are the sum of a background and a local component. The background component is influenced by the cumulative effects of all vehicular traffic in the project vicinity; and the local component reflects the effects of vehicular traffic at the intersection. A full description of the method for estimating the local CO component is contained in Appendix F, Air Quality, p. XIV.F.5. Eight-hour average background concentration for CO is 7.1 ppm for 1985, based on monitoring data, and has been estimated at 5.0 ppm for 2000 and 2020 based on regional emissions projections for 2000.

The eight-hour federal and state CO standard is 9 ppm; the one-hour state standard (more stringent than the federal one-hour standard) is 20 ppm. The concentration in excess of the standard is underlined.

SOURCE: Baseline Environmental Consulting, Inc.

Alternative N. CO concentrations at selected intersections analyzed would be comparable to those identified for Alternative A, except for Third and Berry Streets, where the estimated CO concentration would be highest for Alternative N.

Build-Out/2020

All Alternatives. CO concentrations at the selected intersections listed in Table VI.F.4 would be the same or only slightly greater in 2020 than in 2000. No violations of standards are projected at these intersections in 2020.

Consistency with the 1982 Bay Area Air Quality Plan

The strategies of the 1982 Bay Area Air Quality Plan (Air Quality Plan) are to reduce HC and CO emissions through controls on stationary sources (reduction of HC only) and motor vehicles, and through transportation improvements./8/ The goal of the Air Quality Plan is to achieve federal O_3 and CO standards. Consistency of Mission Bay with the Air Quality Plan is evaluated with respect to proposed transportation improvements, proposed land use development, and land-use/demographic-growth assumptions of the Air Quality Plan, as contained in BAAQMD guidelines and Projections 83./23,24/

Mission Bay would be consistent with some elements of the Air Quality Plan, through its emphasis on public transit for all Alternatives, and pedestrian and bicycle circulation for Alternatives A and B, as described in VI.E. Transportation, p. VI.E.61. Regional and local transportation systems in and around and the Project Area would be constructed as described in VI.E. Transportation, p. VI.E.59.

With regard to land use measures needed to reduce auto emissions, the Air Quality Plan recommends that cities and counties consider modifying their general plans to encourage development in urban service areas, to encourage mixed-use development and infill on vacant land at densities sufficient to support transit, and to encourage rehabilitation and reuse of older buildings. All of the Alternatives would be largely consistent with these recommendations. Alternative A, as the mixed-use Alternative, would be the most consistent of the three.

Mission Bay would be inconsistent with the Air Quality Plan with respect to land use/demographic growth projections for the Project Area. Projections 83 forecasts for the City and County of San Francisco assumed that in 2000, 16 acres in the Project Area would be developed for office use and 153 acres would be developed for 1,500 residential units; the rest of the Project Area was assumed to remain in existing uses./25/ Projections 83 does not forecast beyond 2000, so no comparison for 2020 can be made. However, on the basis of projections for 2000, all Alternatives would represent a substantially more-intensive use of the Project Area than was assumed in Projections 83.

In all, Mission Bay therefore would not be entirely consistent with the goals of the Air Quality Plan, because full development would generate larger amounts of pollutants than the Air Quality Plan assumed.

EMISSIONS FROM STATIONARY SOURCES

The Alternatives include development of S/LI/RD, M-2 Industrial and Port-Related/M-2 uses in portions of the Project Area. Only a small amount of that type of space would be present in Alternative B. Some light industrial uses occupying space under those designations may be direct sources of air pollutant emissions; the types and amounts of pollutants emitted cannot be described, because specific uses are unknown, and are likely to change over time. The uses would be subject to BAAQMD regulations and may require air quality permits to operate.

ODORS

Because odors result from existing conditions or could occur over the build-out period and beyond, they are discussed below specifically for each Alternative at build-out.

Channel Street Pump Station

Potential odor problems in the Project Area are associated primarily with the Channel Street Pump Station operated by the City and County of San Francisco Department of Public Works, Bureau of Water Pollution Control. Mission Bay proposes to develop residential or commercial areas within 200 feet of the Pump Station, potentially exposing future residents and workers to odors generated by wastewater pumping. No odor complaints have been reported for the Pump Station since its construction in 1980./26/ Similar pump stations located in residential areas in other portions of the City have not experienced any odor problems. Hydrogen sulfide odors, the most serious potential odor problem, are rarely associated with pump stations. Odor emissions are regulated in San Francisco by the BAAQMD.

Odor problems may occur episodically, when there has been a mechanical failure. In the event of a mechanical failure, the Pump Station would be shut down immediately. The Channel Street Pump Station has not experienced any failures since its construction./26/ The Bureau of Water Pollution Control recently completed installation of preventive odor control measures at the Channel Street Pump Station, using chemical treatment.

Another source of potential odor associated with the Pump Station would be stormwater overflow events in the City's combined sewage/stormwater system. The City currently has insufficient capacity to handle stormwater runoff. As a result, overflows occur during periods of rainfall. Overflows may include discharge of unknown amounts of untreated sewage mixed with stormwater to discharge locations in the Bay. The Southeast Area Improvements program has been initiated by the City's Clean Water Program to reduce wet weather pollution in the southeastern section of the City, where shallow channel water and the Bay present environmentally sensitive conditions.

Bay Sediments

A second source of potential odor problems in the Project Area is the sediments underlying the waters of San Francisco Bay in inshore areas such as China Basin Channel. Such odor problems would arise from the production of hydrogen sulfide (H_2S), the "rotten egg" gas, during bacterial decomposition of organic matter under anaerobic (i.e., without oxygen) conditions./27/ Such conditions typically are found in bottom sediments where water circulation and tidal flushing are poor. Warm temperatures and high levels of organic matter -- such as from sewage discharge or accumulations of algae -- also promote H_2S generation. Thus, odor problems would most likely arise in China Basin Channel during warm weather, such as occurs in September and October, or following the discharge of large amounts of raw sewage and street runoff, as occasionally occurs during periods of heavy rainfall. Odor from other inshore areas east of the Project Area are possible, but unlikely.

At concentrations of 20 to 150 ppm, H_2S can irritate the eyes; at slightly higher concentrations, it may irritate the upper respiratory tract. Exposure to H_2S may also affect the nervous system and result in headache, dizziness, and other symptoms. Ambient concentrations of H_2S in China Basin Channel and the Bay due to decomposition of organic matter are of nuisance nature only, and would not be sufficiently high to cause human health effects.

Build-Out/2020

Alternative A. Alternative A would not change substantially the amount of wastewater discharged into the channel, nor would it materially affect the circulation or flushing of the channel. Alternative A, however, would greatly increase the number of residents and workers in the vicinity of China Basin Channel and other inshore areas of San Francisco Bay, increasing the potential for exposure of people to odors.

Alternative B. In regard to potential exposure of people to odors from existing sources, Alternative B would be similar to Alternative A. The three proposed wetlands could become a source of odors to which future residents would be exposed, if the wetlands were not designed to flush properly and avoid accumulation of organic material. Mudflats, such as those proposed to be included in the wetlands, are not normally the source of noticeable levels of H_2S gas./27/ For more information regarding wetlands, see VI.M. Vegetation and Wildlife, p. VI.M.1.

Alternative N. This Alternative, like Alternative B, would leave China Basin Channel itself largely unchanged and the timing, composition, and amount of wastewater discharged into it largely unaltered. This Alternative would result in no new residents and fewer workers than in Alternative A in the vicinity of potential sources of odor, so the potential for exposure would be less.

MITIGATION

Mitigation measures F.1 through F.3, below, address the impacts associated with construction-generated fugitive dust. F.1 recommends measures for which the project sponsor would have the primary responsibility for implementation. F.2 is a measure that would primarily involve the Department of Public Works in coordination with the BAAQMD and the project sponsor. Measure F.3 represents a method for determining whether implemented measures prove to be effective. Measure F.4 addresses operational phase emissions that would be generated by motor vehicle traffic associated with the Alternative. Mitigation measures that specifically address the issue of the potential release of air toxics during site development are in the discussion of hazardous wastes under VI.N. Hazardous Wastes, starting on p. VI.N.39, Measures N.1, N.2, and N.3.

Measure	Alternative	Description
F.1	A,B,N	Execute an effective dust control program for demolition, excavation, grading, construction, and other dust-generating activities. This program would include: – sprinkling all unpaved construction areas with water at least twice per day to reduce fugitive dust emissions by approximately 50%; – imposing speed limits for construction vehicles (e.g., 10 miles per hour) in unpaved areas; – covering hauling trucks containing dirt and debris, and minimizing the distances required for disposal of excess spoils; – covering storage piles of dirt or construction debris adequately with plastic sheeting to prevent wind and water erosion; – using canvas drapes to close building floors during application of mineral-based fire insulation to structural steel frames; and – scheduling major dust-generating activities (such as excavation and demolition) for time periods when local winds are anticipated to be less than 12 mph./28/

Measure	Alternative	Description
		By reducing the amount of airborne dust generated by construction, this program would also reduce the amount of toxic dust particles that might also be contained with other dust particles.
F.2	A,B,N	Request that the San Francisco Department of Public Works institute a street-cleaning program for streets within one to two blocks of the Project Area perimeter. BAAQMD monitoring in San Jose has indicated that PM_{10} concentrations from construction activities decrease with distance from the source(s); and that ambient air quality impacts from PM_{10} emissions would be negligible at a distance of one or more blocks from the construction project./29/
		A street-cleaning program should adequately minimize the potential for disturbance of roadway dust, and be performed during periods of demolition and site development (for example, excavation and grading) activities. Streets should be cleaned particularly during the dry, summer and fall seasons. The Department of Public Works and the project sponsor may develop a program, in coordination with the BAAQMD, to ensure that budgetary, personnel, and equipment resources are available. This program could be based on construction schedule information provided by the project sponsor.
F.3	A,B,N	PM_{10} ambient air quality data measured at the San Francisco BAAQMD station should be analyzed by the BAAQMD to monitor the effectiveness of the above dust control measures. The station is less than one mile west of the southern portion of the Project Area and, as situated, would detect any construction impacts from development in the Project Area./29/ If monitoring data indicates that

Measure	Alternative	Description
		PM_{10} standards, particularly the 24-hour average standard, are being violated, then institute local monitoring to determine whether mitigation measures are adequate. If local monitoring identifies PM_{10} violations due to Project Area construction activities, implement the following additional measures: – Re-phasing construction activities where feasible so that the phases of construction that generate the most dust (excavation and grading) at construction sites in the Project Area do not coincide. – Immediately removing material spilled onto public roadways during hauling operations. – Designating a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust off-site.
F.4	A,B,N	Implement mitigation measures designed to reduce motor vehicle trips, as discussed in VI.E. Transportation Mitigation, p. VI.E.198 to reduce the impact of motor vehicle-generated air pollutant emissions on regional and local air quality, consistent with the goals of the 1982 Bay Area Air Quality Plan.

NOTES

SETTING

/1/ Richard Duker, Meteorologist, Bay Area Air Quality Management District, (BAAQMD), telephone conversation, September 9, 1986.

/2/ The marine layer is that portion of the atmosphere that is greatly influenced by large, nearby bodies of water. Characteristically, this layer remains relatively moist year-round and is more moderate with regards to seasonal temperature changes than surface layers distant from large bodies of water.

/3/ James S. Sandberg, Meteorologist, BAAQMD, telephone conversation, September 9, 1986.

/4/ The lower atmosphere generally cools with increasing height above the surface. Air heated at the surface normally rises until it cools to the temperature of the surrounding air. An inversion is a condition where a warmer layer of air overlies a cooler layer. With an inversion, air heated at the surface is restricted to the layer beneath the inversion.

/5/ For example, estimated potential CO concentrations associated with a proposed project are compared with the state standard for a one-hour averaging time; and the federal standard for an eight-hour averaging time. For ozone, potential hydrocarbon emissions (as a precursor to ozone formation) associated with a project are compared with regional estimates of hydrocarbon emissions. For particulates (as well as nitrogen dioxide and sulfur dioxide), potential project-generated emissions are compared with regional emissions.

/6/ The Bay Area Air Basin includes seven counties -- Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties -- and portions of two others -- southwestern Solano and southern Sonoma Counties.

/7/ Previously, the primary San Francisco air quality monitoring station was on 23rd Street (near Tennessee Street), also less than one mile from the Project Area. Data through 1985 were compiled at the 23rd Street Station. Monitoring data for 1986 represent a consolidation of measurements taken at the 23rd Street and Arkansas Street Stations.

/8/ Association of Bay Area Governments (ABAG), BAAQMD, and Metropolitan Transportation Commission (MTC), 1982 Bay Area Air Quality Plan, 1982.

/9/ The four major program elements of the 1982 Bay Area Air Quality Plan were: use of available control technology on existing stationary sources, restrictions on new sources of emissions, a vehicle inspection and maintenance program, and transportation system improvements.

/10/ BAAQMD, "Ozone Measurements and Trends in San Francisco Bay Area, 1965-1984," Information Bulletin 8-8-85, 1985.

/11/ BAAQMD, "Base Year 1982 Emissions Inventory Summary Report," 1983.

/12/ ABAG, BAAQMD and MTC, "Summary of 1979/80 CO Hotspot Monitoring Program," Air Quality Technical Memo 33, 1980.

/13/ The most intensive hot-spot monitoring program was conducted in the winter of 1979-80 in and around San Jose, an area where traffic density and meteorological conditions combine to produce the most violations of CO standards in the Bay Area. Hot-spot monitoring in San Jose indicated that, during worst-case meteorological conditions, inversions have limited upward dispersion of CO emitted during evening traffic peak hours (ABAG, BAAQMD, and MTC, "Urban Background Carbon Monoxide Levels in the Bay Area," Air Quality Technical Memo 42, 1982). Ambient CO levels resulting from these conditions were combined with local emissions to cause high concentrations at the monitored intersections compared to background CO levels monitored at permanent stations.

/14/ Meeting of BAAQMD, San Francisco Department of City Planning, Environmental Science Associates, Inc., Barton-Aschman Associates, Inc., and Baseline Environmental Consulting, November 22, 1985.

/15/ The Downtown Plan EIR projected that the eight-hour CO standard would be violated at the intersection of Sixth and Brannan Streets in 1990 and 2000./17/ The monitoring program measured eight-hour CO concentrations between 5:00 p.m. and 1:00 a.m., from December 13 to 28, 1985. This period was selected because historical BAAQMD monitoring data indicated that worst-case meteorology would be likely to occur in December. Eight-hour maximum concentrations in San Francisco historically have occurred between 5:00 p.m. and 1:00 a.m., and traffic volumes would be high due to the holiday season. Traffic volumes were recorded by the City and County of San Francisco Traffic and Engineering Division during the period of hot-spot monitoring. The results of the hot-spot monitoring are shown in Appendix F, Table XIV.F.6, p. XIV.F.7, and are compared with CO levels recorded at the BAAQMD Potrero Hill Station during the same period. These measurements did not record any violation of standards. The data indicate that concentrations at the intersection of Sixth and Brannan Streets were an average of 2.2 times those measured at the BAAQMD's Potrero Hill station. The mean difference in concentration levels between the two stations during this monitoring program was 2.5 ppm.

A review of CO concentrations recorded at the Potrero Hill Station and at the BAAQMD micro-scale station at Ellis Street indicated that in 1985 worst-case meteorology for CO in San Francisco occurred during early October and early November. The maximum CO concentration recorded at the Potrero Hill Station in 1985 was 7.1 ppm (eight-hour average), in November. This peak CO concentration was 3.6 ppm higher than the peak eight-hour CO concentration of 3.5 measured at the Potrero Hill Station during the December 1985 hot-spot monitoring at Sixth and Brannan Streets.

/16/ Thomas E. Perardi, Manager, Research and Planning Section, BAAQMD, telephone conversation, September 8, 1986.

/17/ Current daily trip numbers were provided by Norman Steinman, Senior Associate, Barton-Aschman Associates, Inc., telephone conversation, October 15, 1987. Emissions of HC, NO_x, CO, TSP, and SO_2 are estimated and compared with regional emission levels, as shown in Table VI.F.1. These calculated emissions assume an average speed of 25 miles per hour and BAAQMD-developed composite emission rates contained in their Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans (November 1985), and revised in April 1988.

/18/ Tirlochan Mangat, Manager, Special Projects Section, BAAQMD, telephone conversation, July 10, 1987.

/19/ San Francisco Department of City Planning, Downtown Plan Environmental Impact Report, EE.81.3, certified October 18, 1984.

IMPACT

/20/ U.S. EPA, Compilation of Air Pollutant Emission Factors (4th Edition), EPA/OAP Pub. AP-42, Volume 1, Research Triangle Park, North Carolina, September, 1985.

/21/ California Air Resources Board, "Particulate Matter Inventory, Weight Fractions by Particulate Matter Category," July 27, 1987.

/22/ Projecting county-wide emissions inventories more than 30 years into the future is not possible because of such unknown factors as the availability of fuel, technological advances, and changes in lifestyle, all of which could dramatically influence future emissions. Thus, Project Area emissions for 2020, when compared with county-wide emissions, should be viewed with the understanding that such a comparison assumes that motor vehicle technology will remain the same from 2000 to 2020 and that Mission Bay development would occur during a period when the rest of the county's growth would be offset such that emissions would remain at year 2000 levels.

/23/ BAAQMD, Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans, San Francisco, California, November 1985.

/24/ ABAG, Projections 83: Population, Employment, and Housing Forecast for the San Francisco Bay Area, June 1983.

/25/ Susan Hootkins, Senior Regional Planner and Land-Use Specialist, ABAG, telephone conversation, September 17, 1987.

/26/ Jerry O'Brien, Project Manager, Odor Control, Bureau of Water Pollution Control, San Francisco Department of Public Works, telephone conversation, September 18, 1987.

/27/ Wetlands Research Associates, Inc., "Sources and Causes of Odor Problems in the San Francisco Bay Area (with special concern to the potential for odor problems at the Mission Bay Open Space Element: wetland creation)," Working Document #5, 1986.

MITIGATION

/28/ Wind speed measurements made in San Francisco and at San Francisco International Airport reveal important characteristics that can be applied to the Project Area. Wind speeds vary throughout the year, with the highest winds occurring in the summer and the lowest in the winter. Wind speeds also have a diurnal cycle, with maximum winds occurring during the afternoon from about 3 p.m. to 7 p.m. Long-term scheduling of excavation should take into account peak seasonal (summer) and diurnal (about 3 p.m. to 7 p.m.) wind speed characteristics, supplemented by forecasts available through either a local forecasting firm or the National Weather Service.

/29/ Dario Levaggi, Bay Area Air Quality Management District, telephone conversation, November 9, 1987.

G. NOISE

SETTING

EXISTING NOISE SOURCES AND NOISE LEVELS

Noise Sources

Major noise sources in the Mission Bay Project Area and vicinity include motor vehicles on major thoroughfares and Interstate 280; freight and passenger trains; freight loading and unloading; ship repair and maintenance; and heavy equipment and machinery operation./1/ Noise in and around the Project Area can be characterized in terms of a relatively steady "background" noise level upon which "intrusive" noises -- isolated noise events that stand out clearly from the background noise -- are superimposed. Background and intrusive noise are two distinct descriptors of the noise environment. Intrusive noise is responsible for much of the annoyance generated by noise sources but, because it is short in duration and intermittent, intrusive noise rarely contributes substantially to the long-term average noise levels upon which community noise standards are based. Background noise can have a wide range of averaging periods, from one-hour averages used to characterize peak-hour traffic noise to 24-hour averaging periods used -- with appropriate adjustments -- to express overall community noise exposure. For a general discussion of what noise is and how it is described, see Appendix G. Noise, p. XIV.G.1.

Intrusive Noise

Intrusive noises in the Project Area and vicinity include train whistles, honking horns, some types of industrial process noises, hammering and banging on metal parts and surfaces, accelerating buses and trucks, and many other miscellaneous noise sources. Accelerating and slowing buses are a prime noise source at the CalTrain terminal at Fourth and Townsend Streets. Four diesel bus lines and one trolley bus line traverse this area during the 4:00 p.m. to 6:00 p.m. peak travel period, generating 104 buses passing Fourth and Townsend Streets./2/ Approximately 12 trains depart and three trains arrive at the CalTrain terminal during the afternoon peak period./3/ The Third and Fourth Street drawbridges generate occasional intrusive noise near China Basin Channel./4/ Additional sources of intrusive noise in the vicinity of Illinois Street are industrial machinery such as conveyor belts, motors, crushers, and heavy equipment. Continental

Maritime of San Francisco, Inc. (CMSFI) east of the Project Area is a major source of occasional, intrusive noise. Concrete plants in the Project Area, one along Third Street and the other at Illinois and Mariposa Streets, are also substantial noise sources.

Background Noise

Traffic on I-280 and Third Street is the primary source of background noise in the Project Area. General human activities associated with warehouse, manufacturing and industrial land uses -- such as machinery operations, diesel trucks, and freight loading/unloading -- also contribute to high background noise levels in the Project Area. Along China Basin Street east of the Project Area, ship repair and maintenance activities also produce noise./5/

Peak-Hour Traffic Noise

Existing peak-hour traffic noise levels were not measured, but were estimated on the basis of existing traffic volumes./6/ Estimated peak-hour traffic noise levels along 11 street segments in and adjacent to the Project Area are shown in the Impact section in Table VI.G.5, p. VI.G.20./6/ Peak-hour traffic noise, in areas where motor vehicle traffic is the dominant noise source, is a good measure of the highest average noise levels (i.e., excluding intrusive noise events) to which the community will be exposed. Portions of the Project Area that are shielded by buildings from major thoroughfares would experience peak-hour noise levels substantially lower than the roadside noise levels presented in Table VI.G.5.

Peak-hour traffic noise in the Project Area is highest along the Third Street corridor; the noise level here is about 73 to 74 dBA, L_{eq}, at roadside. Peak-hour traffic noise is also high along the I-280 corridor; the estimated noise level between Townsend and Mariposa Streets is about 72 dBA, L_{eq}. Peak-hour noise levels of about 66 dBA, L_{eq} along Mariposa Street between Mississippi and Illinois Streets are the lowest in the Project Area. The noise levels on 16th Street between Third and Mississippi Streets, and on Townsend Street between Third and Seventh Streets, both about 67 dBA, L_{eq}, are also low relative to peak traffic noise in other portions of the Project Area. Peak-hour noise levels throughout the Project Area generally are not compatible with residential uses, and are conditionally acceptable for commercial uses, based on the San Francisco Land Use Compatibility Chart discussed below.

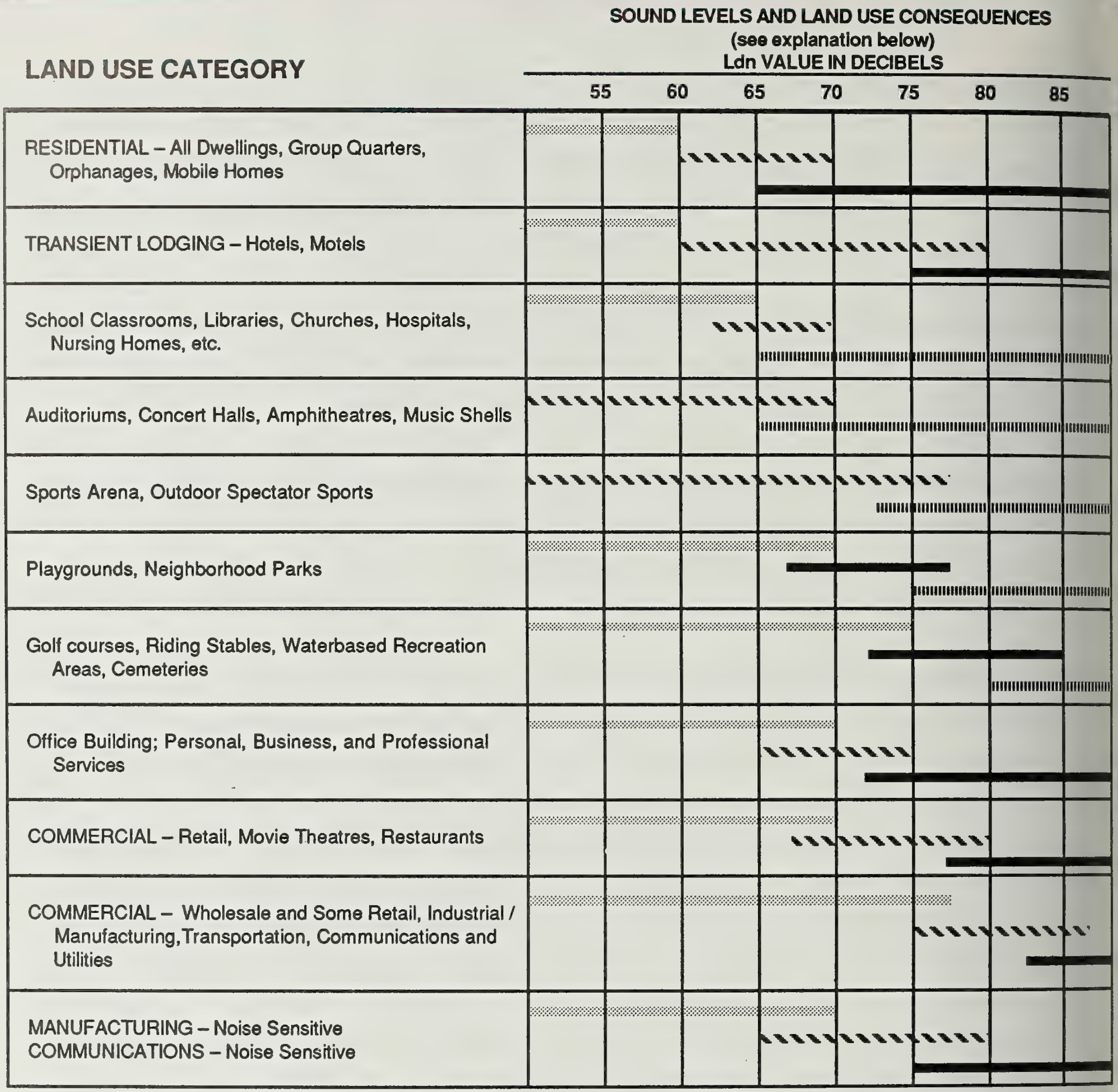
Community Noise

Because traffic is the major noise source in the Project Area, the peak-hour values shown in Table VI.G.5, p. VI.G.20, are good indicators of the maximum one-hour average noise levels along street corridors in the Project Area. Land use compatibility is usually determined, however, by a 24-hour average noise level descriptor such as the day-night average noise level (L_{dn}) used by the City and County of San Francisco as the basis for its "Land Use Compatibility Chart for Community Noise" (see Figure VI.G.1). To calculate the day-night average noise level, 24-hour noise data are required.

To investigate day-night average noise levels, noise levels were measured continuously for 24 hours at six locations in the Project Area. Figure VI.G.2, p. VI.G.5, shows the six noise monitoring locations and dates. Monitoring locations were selected to be representative of a general area. Monitoring results are given in Table VI.G.1, p. VI.G.6.

Community noise levels, expressed as 24-hour average noise levels, are not directly comparable with peak-hour traffic noise. Where traffic is the major source of noise, peak-hour noise levels should be higher than noise levels measured over longer periods. Where non-traffic sources contribute substantially to the overall noise environment, the 24-hour average noise level may be higher than the peak-hour traffic noise level. Calculated noise levels are generally higher than measured noise levels where buildings act as noise barriers, because the noise model does not account for that effect. Calculated noise levels are also often based on worst-case conditions rather than the typical conditions likely to be measured. Taken together, however, the calculated peak-hour (worst-case) traffic noise levels and measured 24-hour average noise levels provide a balanced assessment of the noise environment in the Project Area.

The 24-hour average noise levels measured in the Project Area, presented in Table VI.G.1, are consistent with peak-hour traffic noise levels calculated for major road segments in the Project Area, in indicating a noise environment that is unsuitable for residential uses and conditionally acceptable for commercial uses without implementing noise attenuation measures. The 24-hour average noise level ranges from 75 dBA, L_{eq} on Third Street, a major traffic thoroughfare, to 65 dBA, L_{eq} in the interior of the Project Area away from thoroughfares and other noise sources. When these values are adjusted for enhanced night-time sensitivity to noise, resulting in the day-night average noise levels (L_{dn}), those



EXPLANATION OF LAND USE CONSEQUENCES

░░░░ Satisfactory, with no special noise insulation requirements.

\\\\\\\\ New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

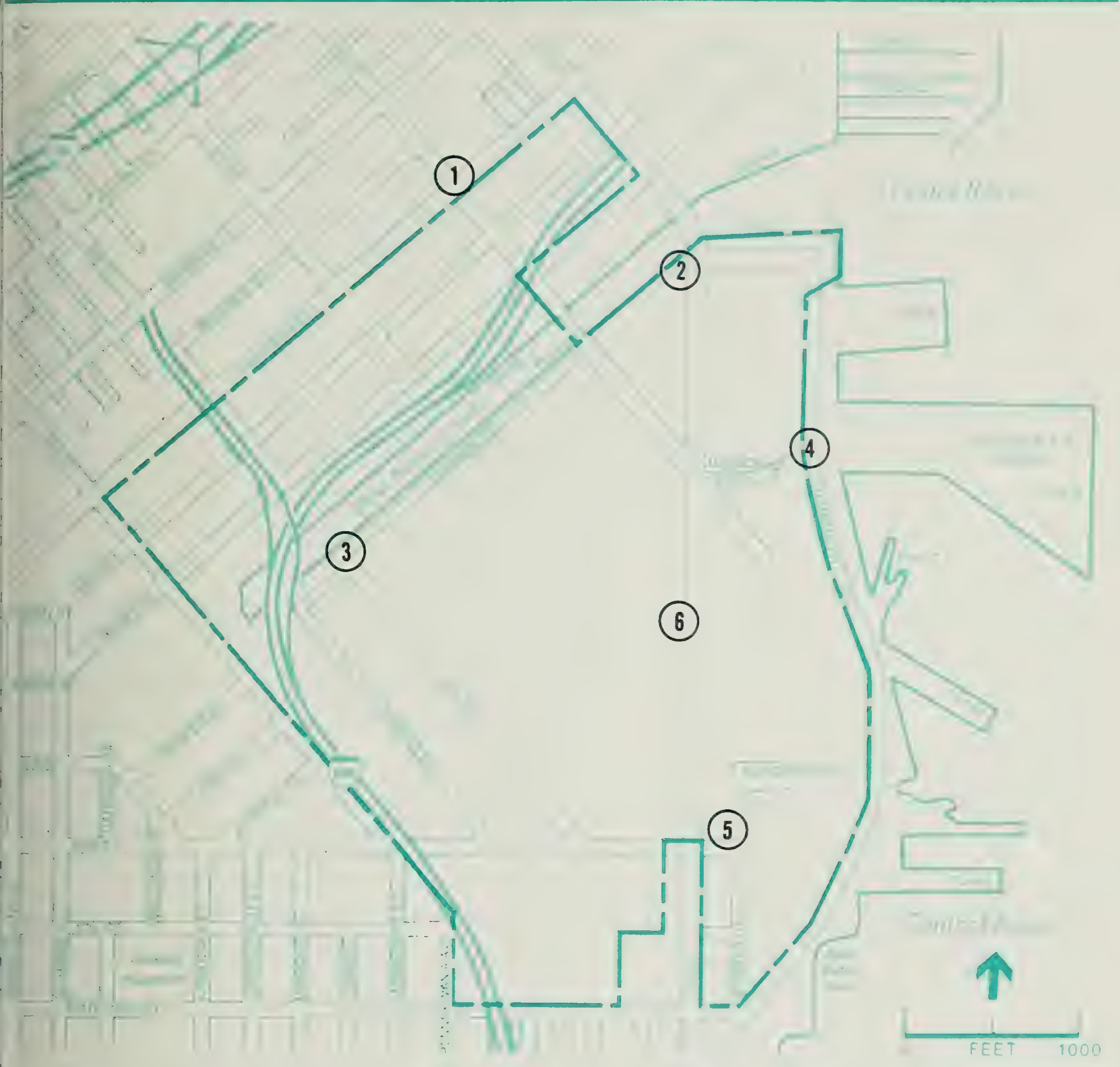
▬▬▬ New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

||||||||||| New construction or development should generally not be undertaken.

Mission Bay

SOURCE: S.F. Department of City Planning, The Plan for Transportation Noise Control, Environmental Protection Element

FIGURE VI.G.1
LAND USE COMPATIBILITY CHART
FOR COMMUNITY NOISE



— — — MISSION BAY BOUNDARY

①	FOURTH AND TOWNSEND STS.	7:35 A.M. 2/27/86 – 7:35 A.M. 2/28/86
②	TIC-TOC DRIVE-IN	7:05 A.M. 2/25/86 – 7:15 A.M. 2/26/86
③	SIXTH AND CHANNEL STS.	7:20 A.M. 2/25/86 – 7:30 A.M. 2/26/86
④	MISSION ROCK AND CHINA BASIN STS.	7:12 A.M. 3/4/86 – 7:10 A.M. 3/5/86
⑤	16TH AND ILLINOIS STS.	7:10 A.M. 3/6/86 – 7:17 A.M. 3/7/86
⑥	THIRD STREET CORRIDOR	7:15 A.M. 3/18/86 – 7:17 A.M. 3/19/86

ission Bay

FIGURE VI.G.2
LOCATIONS OF 24-HOUR NOISE MEASUREMENTS

URCE: Environmental Science Associates, Inc.

TABLE VI.G.1: EXISTING 24-HOUR AVERAGE NOISE LEVELS IN THE PROJECT AREA, 1985/a/

Location/c/	Noise Descriptors (dBA)/b/ Day-Night Noise Level (L_{dn})	24-hour Average Noise Level (L_{eq})	Peak Noise Level (L_{max})	Major Noise Sources
1. Fourth and Townsend Sts. At the northern corner of the intersection, 50 ft. perpendicular to roadway centerlines, and 150 ft. north of the CalTrain terminal entrance.	74	71	102	- Auto, bus and truck traffic on Fourth and Townsend Streets. - Train idling, acceleration and deceleration. - Loading/unloading freight at wholesale, distribution and warehouse businesses.
2. Near China Basin Channel On the south side of the channel, 50 ft. northeast from the centerline of Third St., 150 ft. southwest of the Third St. drawbridge, about 120 ft. southeast of the center of China Basin Channel.	72	69	94	- Auto and truck traffic on Third St. - Truck stop - Loading/unloading freight at wholesale, distribution and warehouse businesses on Third St. - Drawbridges on Third and Fourth Sts. at the channel.
3. Sixth St. at China Basin Channel 120 ft. southeast of the centerline of the channel on the north side of Sixth, about 625 ft. southeast of the train tracks, and 350 ft. southeast of the I-280 skyway.	69	65	83	- Vehicles on I-280 Freeway - Loading/unloading freight at wholesale, distribution and warehouse businesses on Sixth St. - Traffic on Seventh St. - Trains on tracks between Sixth and Seventh Sts. - Train whistles.
4. Mission Rock St. at China Basin St. (Block 3880) 100 ft. west of Pier 50 and 300 ft. east of Third Street.	68	66	94	- Auto and truck traffic on Third St. - Freight loading/unloading. - Industrial process noise. - Ship repair and maintenance.
5. 16th St. at Illinois St. At the southwest corner of the intersection, 40 ft. south of the 16th St. centerline, 20 ft. west of the centerline of Illinois St.	69	67	98	- Industrial process noise (conveyor belts, crushers, motors, machinery) - Auto and truck traffic on Third St. - Ship repair and maintenance.
6. Third St. between Fourth St. and 16th St. About 1,000 ft. south of Fourth, on the west side of Third (near United Coffee),	79	75	103	- Auto and truck traffic on Third St. - Freight loading/unloading. - Concrete manufacturing.

/a/ Noise measurements were made during February and March of 1986 with a Metrosonics model db-306A Metrologger equipped with windshield. Calibrations were performed prior to each measurement.

/b/ In general, average noise levels between 7:00 a.m. and 10:00 p.m. are one dBA, L_{eq} greater than the 24-hour average, while the average noise level between 10:00 p.m. and 7:00 a.m. is four to eight dBA, L_{eq} less than the 24-hour average. In each case, the peak noise level occurred during the 7:00 a.m. to 10:00 p.m. period.

/c/ See Figure VI.G.2, p. VI.G.5, for exact locations of measurements.

SOURCE: Environmental Science Associates, Inc.

values become 69 and 79 dBA, respectively. The City's land use compatibility guidelines discourage new residential construction in areas where the noise level exceeds 65 dBA, L_{dn}; the guidelines discourage offices above 72 dBA, L_{dn} and manufacturing above 75 dBA, L_{dn}. The City's land use compatibility standards are discussed below under "Noise Standards, Plans and Policies."

Sensitive Receptors

For the most part, the Project Area and immediate vicinity are occupied by industrial and commercial uses that are relatively insensitive to noise. A few isolated land uses are considered sensitive to noise, however, and could be adversely affected by increased future noise levels. The houseboats in China Basin Channel are a residential use. The Recreational Vehicle Park across Fourth Street from the CalTrain Station at Fourth and Townsend Streets and the Washington Hotel, located just outside the Project Area near the CalTrain terminal, are also relatively noise-sensitive land uses. In general, high noise levels can decrease the quality of relaxation and ability to sleep for both temporary and permanent residents./7/

Office, restaurant and recreational uses are considered moderately sensitive to noise. Office uses in the Project Area are located in the area bounded by Third Street on the east, Townsend on the northwest, and Seventh Street on the southwest; the Eye Institute on China Basin Street just east of the Project Area also includes office uses. Restaurants and public shoreline access areas along the channel and China Basin Street also adjoin the Project Area on the east (see also Figure VI.D.3 p. VI.D.12).

Noise Standards, Plans and Policies

Mission Bay would be subject to portions of Title 24 of the California Administrative Code that address interior noise levels for some types of new residential uses; the City and County of San Francisco Noise Ordinance; and the noise-related policies of the Environmental Protection Element of the City's Master Plan.

Title 24 Noise Insulation Standards. This section of the state code (formerly part of Title 25) limits allowable interior noise level in multi-family residential units to 45 dBA, Community Noise Equivalent Level (CNEL)./1/ For new multi-family construction proposed in areas where the existing exterior noise level is greater than 60 dBA, CNEL, it also requires, that an acoustical analysis be prepared to demonstrate that the interior noise level would not exceed 45 dBA, CNEL. The day-night average noise level, L_{dn}, is approximately equivalent to the CNEL.

San Francisco Noise Ordinance (Part II, Chapter VII, San Francisco Municipal Code). This ordinance limits construction noise to 80 dBA at 100 feet, and limits allowable construction noise between 8:00 p.m. and 7:00 a.m. to five decibels above the ambient noise level at the property line, unless the Department of Public Works issues a special permit.

Environmental Protection Element. The Element includes the Plan for Transportation Noise Control, which includes several objectives and policies for controlling traffic noise, the principal source of community noise in the City. Those objectives and policies to be considered for new development in the Project Area are listed in Table VI.G.2.

TABLE VI.G.2: OBJECTIVES OF SAN FRANCISCO PLAN FOR TRANSPORTATION NOISE CONTROL

Objective 1:	Reduce transportation-related noise.
Policy 2:	Impose traffic restrictions to reduce transportation noise.
Policy 5:	Retain and expand the electric trolley network.
Policy 6:	Discourage changes in streets which will result in greater traffic noise in noise-sensitive areas.
Objective 2:	Minimize the impact of noise on affected areas.
Policy 1:	Promote site planning, building orientation and design, and interior layout that will lessen noise intrusion.
Policy 2:	Promote the incorporation of noise insulation materials in new construction.
Policy 3:	Construct physical barriers to reduce noise transmission from heavy traffic carriers.
Objective 3:	Promote land uses that are compatible with various transportation noise levels.
Policy 1:	Discourage new uses in areas in which the noise level exceeds the noise compatibility guidelines for that use.
Policy 2:	Consider the relocation to more appropriate area of those land uses which need more quiet and cannot be effectively insulated from noise in their present location, as well as those land uses which are noisy and are presently in noise-sensitive areas.
Policy 3:	Locate new noise-generating development so that the noise impact is reduced.

SOURCE: San Francisco Department of City Planning, Plan for Transportation Noise Control, Environmental Protection Element of the Master Plan, adopted by the San Francisco City Planning Commission, Resolution 7244, September 1974.

IMPACT

INTRODUCTION

Twenty-four hour average noise levels in the Project Area were measured during February and March of 1986, and are shown in Table VI.G.1, p. VI.G.6. Those measurements indicate that existing noise levels are high in relation to the types of land uses proposed for Alternatives A and B, and to some extent for Alternative N. Development of residential and open space uses in this noise environment would not respond to guidelines in San Francisco's "Land Use Compatibility Chart for Community Noise" (see Figure VI.G.1, p. VI.G.4). The following noise impacts analysis indicates that future noise levels in the Project Area would be noticeably higher regardless of the Alternative. That would be due initially to construction noise and, later, to noise from the projected increase in vehicle traffic accompanying the project. Given these high known and projected future outdoor noise levels, remaining tenants, new residents, and new employees of the Project Area would require protection from noise, which is discussed under Mitigation.

Until build-out is reached, construction activity would be a substantial source of noise in the Project Area. This noise analysis begins with a description of the impacts of construction noise on land uses within and around the Project Area. Noise sources are identified; peak and average noise levels at land uses planned under each Alternative are evaluated. The varying quality and intensity of noise produced by construction equipment, and noise attenuation by intervening buildings, building materials, and distance are considered. Construction noise effects are treated as continuous or intermittent, depending on the source of noise, over the entire build-out period.

In the second part of this analysis, roadside and area-wide (composite) noise levels produced by evening peak-hour vehicle traffic at build-out under each Alternative are estimated and evaluated. Unless otherwise noted, a separate discussion of operational noise impacts in the interim analysis year has not been included because differences between noise conditions in 2000 and 2020 would be insignificant. The results of computer modeling of evening peak-hour vehicle traffic noise for each Alternative are presented and discussed. The effects of future non-traffic noise on sensitive receptors are also discussed. Noise attenuation by exterior walls of buildings has been included in the analysis and discussion of future traffic and non-traffic noise levels. In addition, benefits derived from site planning as it affects outdoor noise levels, especially at open space, have been included in the discussion. These latter statements are necessarily qualitative because specific building dimensions, materials, and orientation have not been determined.

In the last section of this analysis, projected noise impacts are presented in light of existing noise standards, plans, and policies. Specific elements of the Alternatives that conflict with pertinent standards are identified. The Mitigation section, following the noise impacts analysis, suggests measures to minimize identified noise impacts. Appendix G. p. XIV.G.1, discusses the physics of noise propagation; the different types of noise to which Project Area receptors would be exposed; their interactive effects, measurement conventions, and common noise impact mitigation measures; and computer modeling of vehicle noise.

CONSTRUCTION NOISE

Noise Sources

Noise from project construction activities is expected to continue over the build-out period. During that period, Project Area noise levels would vary according to type of construction activities underway, location of activities, and construction methods and equipment used. Table VI.G.3 shows noise levels typical of various construction activities; these noise levels represent composite noise levels resulting from overlapping operation of multiple pieces of construction equipment. Within several hundred feet of construction sites, construction noise would be attenuated by distance and intervening buildings to ambient noise levels, as shown. At those distances, individual sources of noise from within construction site(s), other than intrusive noise events, would fade into background noise and could not be distinguished from it. Construction equipment contributing to the noise levels presented in Table VI.G.3 is shown in Table VI.G.4, p. VI.G.13. Table VI.G.4 includes noise sources such as impact tools that generate intense but intermittent noise. Intrusive noise events resulting from operation of this equipment would be heard at greater distances from the construction site than would general construction noise.

The construction activities, equipment, and noise levels shown in Tables VI.G.3 and VI.G.4 are representative of those that would occur under any Alternative. Potential interior

TABLE VI.G.3: TYPICAL NOISE LEVELS DURING CONSTRUCTION OF LARGE BUILDINGS

Construction Activity	Noise Level at 50 Feet (dBA, L_{eq})/a/	Approximate Distance (ft.) To Reduce Noise to Given Level (dBA, L_{eq}) 60	65	70
Ground Clearing	84	790	450	250
Excavation	89	1,400	800	450
Foundations	78	400	220	130
Erection	85	890	500	280
Finishing	89	1,400	800	450

NOTE: Noise levels in this table are worst-case levels for typical combinations of construction equipment and activities; noise attenuation methods for construction equipment have not been applied, nor has potential attenuation by intervening buildings between source and receptor been assumed.

/a/ The noisiest piece of equipment is 50 feet from the receptor, and other equipment is 200 feet from the receptor. Noise levels at 100 feet from the noisiest piece of equipment would be about six dBA, L_{eq} lower than those shown above, assuming no noise attenuation by obstructions.

SOURCE: Bolt, Beranek, and Newman, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, Report Number NTID300.1, for the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C., December 1971.

and exterior noise levels associated with each type of activity are identified, assuming sound attenuation by intervening buildings and construction materials as indicated. Differences in Project Area noise impacts between Alternatives would be due primarily to different timing and quantity of construction, and different distances between construction sites and noise-sensitive receptors. Those differences are described by Alternative in the following subsections. Noise levels perceived outside the Project Area would vary according to the proximity and phasing of construction activities.

Alternative A

Changes in the Project Area infrastructure would generate combined noise levels similar to those presented in Table VI.G.3. Those changes would include removing the I-280 freeway stub and constructing new ramps, relocating the CalTrain Station from Fourth

TABLE VI.G.4: TYPICAL NOISE LEVELS FROM SELECTED CONSTRUCTION EQUIPMENT/a/

Equipment	Noise Level (dBA, L_{eq})		Approximate Distance (ft.) To Reduce Noise to Given Level (dBA, L_{eq})		
	50 Feet	100 Feet	60	65	70
Earthmoving					
Front Loader	79	73	450	250	140
Backhoe	85	79	890	500	280
Bulldozer	80	74	500	280	160
Tractor	80	74	500	280	160
Scraper	88	72	1,260	710	400
Grader	85	79	890	500	280
Truck	91	85	1,800	1,000	560
Paver	89	83	1,400	800	450
Dredging	79	73	450	250	140
Materials Handling					
Concrete Mixer	85	79	890	500	280
Concrete Pump	82	76	630	350	200
Crane	88	82	1,300	710	400
Derrick	88	82	1,300	710	400
Stationary					
Pumps	76	70	320	180	100
Generator	78	72	400	220	130
Compressor	81	75	560	320	180
Impact/b/					
Pile Driver/c/	101	95	5,600	3,200	1,800
Jack Hammer	88	82	1,300	710	400
Rock Drill	98	92	4,000	2,200	1,300
Pneumatic Tools	86	80	1,000	560	320

/a/ Noise levels in this table are worst-case estimates for individual pieces of equipment; no obstructions between source and receptor or special noise attenuation methods for equipment are assumed.

/b/ Impact equipment was not included in the typical noise levels from general construction activities presented in Table VI.G.3.

/c/ The repetitive and intrusive nature of pile-driving noise generally is considered more disruptive than continuous or steady sounds of comparable level.

SOURCE: Environmental Science Associates, Inc., using information from Bolt, Beranek, and Newman, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, Report Number NTID300.1, for the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C., December 1971, and Jack Golden et al., Environmental Impact Data Book, Ann Arbor Science Publishers Inc., Ann Arbor, Michigan, 1979.

and Townsend Streets to Seventh and Channel Streets, dredging the channel, and constructing a new bridge at Owens Street. Noise generated by those activities, especially intermittent noise from such activities as demolition, would disturb existing sensitive receptors, including houseboat residents./8/ Outdoor noise levels at the houseboats could reach 83 dBA, L_{eq} and probably would not be attenuated to less than 73 dBA, L_{eq} by houseboat walls due to their light-weight construction./9/ Noise at that level could cause adverse physiological effects in people who would be present for prolonged periods during construction. Temporary residents of the Washington Hotel may also be annoyed by this construction activity; these residents would experience indoor noise levels up to 70 dBA, L_{eq}, with open windows. Existing noise-sensitive commercial establishments, located primarily east of the Project Area, probably would not be affected by noise from construction in the Project Area due to distance and the presence of intervening buildings.

Alternative A would require dredging the channel (see VI.L. Hydrology and Water Quality p. VI.L.23), which would generate noise heard by residents of the houseboats and new housing built early in the Project. Indoor noise levels would be 10 to 35 dBA lower than outdoor levels, depending on the materials used in the structure and whether windows were open or closed./9/ Noise levels inside a houseboat with open windows could exceed 69 dBA, L_{eq} depending on the location of the houseboat relative to the dredging activities and the noise-attenuating capacity of the houseboat. That noise level would be annoying and would interfere with conversation. MDR residents south of the channel could be exposed to indoor noise levels of 63 dBA, L_{eq} with windows open, which may interfere with verbal communication. MDR residents could be exposed to indoor noise levels of about 55 dBA, L_{eq}, if windows were open during dredging./8/

Figure VI.K.8, p. VI.K.25, identifies areas that would require piles for foundations. Pile-driving noise originating from the periphery of those areas could be heard as far away as Rincon Hill to the north, Howard Street to the northwest, Route 101 to the west, and 23rd Street to the south. Beyond those areas, pile-driving would not be heard above background noise. Because pile-driving typically occurs for about 5 to ten minutes out of the hour, exposure to this noise source would not be continuous. However, the repetitive nature of the noise and the accompanying vibrations would be disruptive and annoying to remaining tenants and, during later years, to residents. Instantaneous indoor noise levels with open windows could exceed 85 dBA, L_{eq} at any location within the Project Area, depending on the construction site. Indoor noise levels during pile driving would probably reach 64 dBA, L_{eq} with windows closed and 89 dBA, L_{eq} with the windows open, which could interfere with verbal communication. Such intrusive noise events would be very annoying and could disrupt normal daytime activities within 100 feet of the pile driver if indoors with windows open, and up to 800 feet away if outdoors. Outdoor noise levels along the southwestern side of Fourth Street, between Townsend Street and Berry Street, could reach 99 dBA, L_{eq}.

Houseboat residents and pleasure-craft users of the channel could be exposed to outdoor noise levels up to 93 dBA, L_{eq}. Noise levels within these boats would probably exceed 73 dBA, L_{eq} due to their relatively light-weight construction. Noise levels of this magnitude would be annoying and may produce physiological effects, such as a change in motor coordination. Existing restaurants and offices along China Basin Street would be exposed to outdoor noise levels reaching 79 dBA, L_{eq} and indoor noise levels of about 44 dBA, L_{eq}, with windows closed, which would not interfere with most activities. With windows open, verbal communication would be difficult. Pile driving would produce peak noise levels of about 100 dBA, L_{eq} in open spaces adjacent to the construction sites, such as OS-1. Noise at this level would detract from the aesthetic enjoyment of planned open space.

Noise from construction trucks hauling excavated material primarily would affect existing land uses along Third and Mariposa Streets, which would be the main access route to and from U.S. 101 via I-280 (see VI.E. Transportation, p. VI.E.188). Shipments from the East Bay would arrive via the Fifth and Fourth Street ramps. Noise from individual or queued trucks might be noticed by occupants of streetfront buildings. However, noise from truck traffic within the Project Area along Third Street, south of Division Street, would probably not affect the relatively noise-tolerant land uses in that area. Heavy trucks would continue to remove excavated material from the construction sites through 2020. Noise from trucks along Third Street would be undiminished by distance because residents of new housing would be adjacent to roads providing access to construction sites. Interior noise levels could reach 56 dBA, L_{eq}.

Construction planned for Alternative A would produce noise levels similar to those presented in Table VI.G.4, p. VI.G.13. Houseboat residents and pleasure-craft users of the channel would be exposed to outdoor noise levels up to 77 dBA, L_{eq} from excavation and finishing phases of construction activities. This estimate is based on the assumption that construction would be under way about 200 feet away from housing, with no intervening obstructions. Interior noise levels would probably reach 67 dBA, L_{eq} with open windows.

Noise levels this high would make conversation difficult. Existing office and retail space along the northwestern side of the channel would be exposed to exterior noise levels of about 73 dBA, L_{eq} from construction southeast of the channel. Interior noise levels could reach 63 dBA, L_{eq} which may interfere with normal activities. Occupants of offices and restaurants along China Basin Street would probably not notice construction noise, other than pile-driving, until construction of the medium-density residential development east of Third Street was begun.

During later years of development when the interior of the Project Area would have been developed into housing and retail, the closest noise-sensitive receptors to construction activities would be along Third Street, where housing could be about 50 feet away (the approximate width of Third Street). Outdoor noise levels along the western side of Third Street, from Fourth Street to 16th Street, could reach 89 dBA, L_{eq}. Depending on the construction materials used in the buildings, about 35 dBA of attenuation could be provided by the building envelope with windows closed, lowering indoor noise levels to 54 dBA, L_{eq}, which would not interfere with conversation or other normal activities. Other construction in later years would occur northwest of the channel between Fourth and Seventh Streets (perhaps less than 100 feet), exposing nearby houseboat residents to outdoor noise levels of up to 83 dBA, L_{eq}.

Initial Phase of Development

The initial phase of development would produce noise levels similar to those described above, but on a smaller scale. Construction of office and retail space at Third Street and Townsend Street would be heard by temporary residents of the Washington Hotel, where indoor noise levels could exceed 70 dBA, L_{eq}. The channel would be dredged in the initial phase. Construction of housing between Owens and Fourth Streets, southeast of the channel, would probably not disturb houseboat residents, except during pile-driving when instantaneous indoor noise levels could reach 76 dBA, L_{eq}. Construction of S/LI/RD between 15th and 16th Streets would not substantially affect any noise-sensitive receptors. Occupants of the initial phase of development would probably not be affected by noise from infrastructure construction. Indoor noise levels at the MDR south of the channel could reach about 53 dBA, L_{eq} with the windows open during the loudest phases of infrastructure construction. New residents and employees would be affected by construction of later phases of development, as described above.

Alternative B

Infrastructure changes in the Project Area for Alternative B would generate noise levels similar to those described for Alternative A. Under Alternative B, however, the channel would not be dredged. Another difference between Alternatives A and B would be construction under Alternative B of an additional bridge on China Basin Street where the bayfront wetland connects to the bay. Noise from construction of that bridge would go largely unnoticed because there are no noise-sensitive land uses nearby.

Noise generated by pile-driving required for development in Alternative B, (the areas that would require driven piles are shown in Figure VI.K.9, p. VI.K.26), and the areas exposed to noticeable increases in ambient noise levels during construction, would be about the same as those described under Alternative A, above.

Noise produced by soil excavation would be similar to that presented for excavation and construction trucks under Alternative A, above. Excavation would take place over a wider area than for Alternative A, but would be no more noticeable than under Alternative A because of the high existing background noise levels. Noise may be noticeable to houseboat and pleasure-craft users in the channel for a longer period than under Alternative A due to dry-dredging for wetlands development.

The noise generated by construction in the Project Area would be similar to that described for Alternative A. Houseboat residents and pleasure-craft users of the channel would be exposed to noise levels similar to those estimated for Alternative A. Construction of MDR, planned for the northwestern portion of the Project Area, would be heard over background noise almost to Seventh Street. Because this Alternative includes 3,200 more dwelling units than Alternative A, more residents would be exposed to construction-related noise over the full build-out period. These new Mission Bay residents would be exposed to noise levels similar to those discussed for Alternative A.

Initial Phase of Development

During the initial phase of development, noise from construction would be limited to the area south of the channel, bounded by Sixth Street to the east, CalTrain rail lines to the west, and the future Hubbel Street to the south. Early construction activities would be adjacent to existing houseboats, which would be affected by construction noise. Pile-driving, needed for the planned office space, could cause indoor noise levels at the houseboats to reach 76 dBA, L_{eq}. Other construction activities would increase indoor noise levels at the houseboats to about 60 dBA, L_{eq}.

Occupants of the initial phase of development probably would not be affected by noise from any infrastructure construction. Indoor noise levels at the MDR planned for Owens Street could reach about 50 dBA, L_{eq} with windows open. Occupants of this early phase would be affected by construction noise of later phases.

Alternative N

Infrastructure changes for Alternative N would include removal of the I-280 stub and changes in the freeway ramps. Noise produced by those activities would have the same effects as those described for Alternative A.

Pile-driving could be required for construction in areas shown in Figure VI.K.10, p. VI.K.27. This activity would generate short-term intrusive noise of about the same magnitude as that described under Alternative A, above. Noise generated by trucks hauling excavated material from the Project Area also would be similar to that discussed for Alternative A.

The peak noise generated by construction would be similar to that described for Alternative A. Construction of office space planned for the area between Fourth and Third Streets, southeast of Townsend Street, would affect the same areas as described for Alternative A.

The only noise-sensitive land uses in the Project Area under Alternative N would be houseboat residents, and recreational users of the channel and adjoining open space. Outside the Project Area, temporary residents of the Washington Hotel would be exposed to construction noise. During pile-driving, these receptors could be exposed to outdoor noise levels reaching 93 dBA, L_{eq}. Interior noise levels would probably exceed 80 dBA, L_{eq} during individual impacts. This noise would be intrusive and disruptive.

OPERATIONAL NOISE

Peak-Hour Traffic Noise

Traffic would be a dominant source of background noise in the Project Area. Noise heard by pedestrians, tenants, and employees in the Project Area would vary by time of day and location. At times, noise from construction activities would be dominant, with traffic noise contributing to the background noise levels. During the morning and evening peak traffic hours, noise from traffic, as described below, would dominate the local noise environment and construction noise would be less noticeable.

This analysis focuses on noise produced by evening peak-hour vehicle traffic./10/ The noise analysis indicates that traffic is, and would continue to be, the dominant source of outdoor noise in the Project Area following construction. Traffic noise was assessed both in terms of roadside noise levels along major road segments in the Project Area (roadside analysis) and composite peak-hour traffic noise levels in the interior of the site that would result from the contributions of more than one road segment. The results of the composite analysis are presented in Appendix G. Table XIV.G.1, p. XIV.G.4./11/ In the roadside noise analysis, existing and future roadside noise levels along 11 individual road segments were calculated; the results of that analysis are presented in Table VI.G.5. Future noise levels presented in this analysis are worst-case projections based on traffic data (project and cumulative volumes) provided by Barton-Aschman Associates./12/

Peak-hour traffic noise levels estimated for road segments within the Project Area indicate that each Alternative generally would result in noise levels at build-out that were higher than the existing high-noise environment in the Project Area and would become noticeable around 2000. For each Alternative, the areas adjacent to Third Street, from Fourth Street south to Mariposa Street, would become noticeably noisier. Two road segments would become noticeably quieter than existing conditions because traffic would be diverted from them by the reconfiguration of the I-280 ramps: Third Street between Channel and Townsend Streets, and Berry Street between Third and Fourth Streets. Noise levels at specific locations would not be noticeably different among the Alternatives, because of relatively small variations in total traffic volumes among the Alternatives. The noisiest existing location in the Project Area, on Third Street between Fourth and 16th Streets, would not become noticeably noisier under any Alternative. That is, Third Street would continue to be the noisiest area, but noise levels would not become

---

TABLE VI.G.5: ESTIMATED COMPOSITE AFTERNOON PEAK-HOUR TRAFFIC NOISE LEVELS (dBA, L_{eq}) ON SELECTED ROAD SEGMENTS, BY ALTERNATIVE, FOR 1985 AND BUILD-OUT/2020/a/

		2020 Alternative		
Street Segment/c/	1985	A	B	N
Third Street between Fourth and 16th Streets	74	$\underline{79}$ /b/	$\underline{79}$	$\underline{80}$
Third Street between 16th and Mariposa Streets	73	$\underline{77}$	$\underline{77}$	$\underline{79}$
Third Street between Fourth and Channel Streets	73	$\underline{76}$	75	$\underline{77}$
Third Street between Channel and Townsend Streets	74	$\underline{71}$ -	$\underline{71}$ -	72 -
Interstate 280 between Townsend and Mariposa Streets/d/	72	73	73	73
Berry Street between Third and Fourth Streets	70	$\underline{64}$ -	$\underline{64}$ -	$\underline{64}$ -
Mariposa Street between Mississippi and Illinois Streets	66	$\underline{73}$	$\underline{73}$	$\underline{76}$
16th Street between Third and Mississippi Streets	67	$\underline{72}$	$\underline{72}$	$\underline{72}$
Seventh Street between Townsend and 16th Streets	70	71	71	72
Fourth Street between Townsend and Third Streets	69	$\underline{72}$	$\underline{72}$	$\underline{73}$
Townsend Street between Seventh and Third Streets	67	68	68	69

/a/ Modeled based on vehicle volumes given in Transportation Setting and Impact Sections of this report (see Figure VI.E.3, p. VI.E.9). All trucks were assumed to be "heavy trucks"; other vehicles were modeled as automobiles. Noise levels in 2000 would be similar to those reported for 2020 in all cases. Appendix G. p. XIV.G.3, provides more information about the modeling.

/b/ Underlined values are noticeably different (by more than three dBA up or down) from existing conditions. A minus sign indicates a noticeably lower noise level than existing conditions.

/c/ Segments modeled at a reference distance of 15 meters (49 feet) and 50 km/hr (31 mph), unless otherwise noted.

/d/ Reference distance of 50 meters (164 feet), traffic speed of 72 km/hr (45 mph).

SOURCE: Environmental Science Associates, Inc.

noticeably higher there. However, the quietest location in the Project Area (on Mariposa Street) would be noticeably noisier than existing conditions for all Alternatives.

On the basis of traffic noise alone, the noisiest and quietest locations within the Project Area would be the same for all Alternatives. The quietest areas, as shown by the composite noise analysis (see Appendix G. Table XIV.G.2 p. XIV.G.6), which provided more complete coverage of the Project Area than the roadside noise analysis, would be south of China Basin Channel, between Fourth and Sixth Streets, and along the eastern shoreline of the Project Area. The noisiest areas would be near the I-280 overpass, especially at Mariposa Street, and along Third Street south of Fourth Street. While the composite noise analysis is conservative in that it does not take noise attenuation by buildings into account, it is useful in identifying relatively high or low noise portions of the Project Area, and in comparing Alternatives.

Traffic generated by each Alternative would cause the already high noise levels existing in the Project Area to increase and the area exposed to high noise levels to expand. Alternatives A and B would result in smaller areas of increased noise level than would Alternative N. Conversation outdoors would continue to be difficult, and would become more difficult in areas where the existing conditions indicate that conversation outdoors is already marginal./8/ Peak-hour indoor noise levels could reach 70 dBA, L_{eq} in the noisiest portions of the Project Area if windows were open. Maximum noise level increases would occur along Mariposa Street near Third Street (Table XIV.G.2 receptors 23 and 24, p. XIV.G.6) due to the anticipated large increase in vehicle traffic along Mariposa Street.

Noise levels outside the Project Area, but adjacent ot it, are expected to be unaffected (less than a three-dBA change) by Mission Bay traffic, because of the existing high background noise levels in adjacent areas and attenuation by intervening buildings.

Peak-hour roadside noise levels at build-out in 2020 would range from about 64 to about 80 dBA, L_{eq}, relatively independent of the Alternative. The composite noise analysis indicates that background noise levels would be higher than existing conditions throughout the Project Area (except for the previously mentioned areas along Berry and Third Streets) but would not be perceptibly louder in all locations. Noticeable noise level increases would be confined to areas adjacent to and east of Third Street, and south to Mariposa Street.

Alternative A

Under Alternative A, peak-hour automobile traffic in the Project Area would increase by about 3,100 vehicles (17%) and truck traffic would increase by about 1,200 vehicles (100%). Overall, traffic would increase by about 22% over existing conditions. The composite noise analysis indicates that maximum and minimum peak-hour traffic noise levels for Alternative A would be 79 and 64 dBA, L_{eq}, respectively, and would occur in the same areas as under existing conditions (see Appendix G. p. XIV.G.6). The results of the roadside noise analysis, presented in Table VI.G.5, p. VI.G.20, indicate that the minimum noise level of 64 dBA, L_{eq} would occur along Berry Street. The noisiest area would be along Third Street, between Fourth and 16th Streets. The greatest increase in noise level would occur along Mariposa Street between Mississippi and Illinois Streets due to the expected doubling of automobile traffic and five-fold increase in truck traffic./12/

The noise level along Berry Street would be relatively low due to the expected 74% decrease in traffic from existing conditions along that segment. The quietest areas in the Project Area would be midway between I-280 and Fourth Street, along China Basin Channel and along China Basin Street. Peak-hour traffic noise levels in these areas would be about 65 to 66 dBA, L_{eq}. Both the roadside noise analysis (Table VI.G.5, p. VI.G.20) and the composite noise analysis (Table XIV.G.2, p. XIV.G.6) indicate that noise levels along Third Street between Channel and Townsend Streets would decrease. Noise levels along this segment may decrease by one to three decibels due to the expected 47% decrease in truck traffic there./12/

Traffic noise generated by Alternative A would have no noticeable effect on open spaces along China Basin Channel (OS-3, OS-4, OS-6) or the proposed park at China Basin (OS-1) due to buffering by intervening buildings and to distance attenuation. Noise levels in those areas would increase by no more than two dBA, L_{eq}. Houseboat residents on the channel would not experience noticeable noise level changes due to traffic. Noise levels in the "central square" area (OS-5) of the project would increase noticeably from 65 to 69 dBA, L_{eq} because of increased automobile and truck traffic along Third Street. Outdoor noise levels at OS-10 would reach 71 to 72 dBA, L_{eq} because traffic noise from 16th Street would not be attenuated by intervening buildings. Noise levels at OS-7 and OS-8 also would exceed 70 dBA, L_{eq} during the peak traffic period because vehicle noise would not be substantially attenuated.

Alternative B

Alternative B would result in noise levels similar to those under Alternative A. As for Alternative A, the largest increase in peak-hour traffic would occur along Mariposa Street due to a 93% increase in autos and a five-fold increase in trucks. Also like Alternative A, traffic along Berry Street would decrease by about 75%. Overall, traffic would increase about 18% over existing conditions. Portions of the proposed mid-channel wetland would be the quietest outdoor areas in the Project Area. Exceptions would be areas adjacent to the I-280 overpass, such as the intersection of Sixth and Channel Streets, OS-3, and the two-acre open space (OS-4) planned for under the I-280 overpass. At those locations, composite traffic noise levels would be up to 70 dBA, L_{eq}, on the assumption of no building attenuation, and passive recreational activities could be disrupted. Other open spaces in the Project Area would be buffered from traffic noise by intervening buildings. OS-1, OS-2, and OS-5 would be relatively sheltered from major traffic arteries. Noise levels there would be about 66 dBA, L_{eq}. The other open spaces OS-6 through OS-11 would be partially attenuated by traffic noise or would be located adjacent to roadways that are not expected to carry high traffic volumes. Noise levels in these areas could range from 65 to 75 dBA, L_{eq}, during the peak hour.

Alternative N

Alternative N would result in the highest noise levels in the Project Area. Although peak-hour automobile traffic would increase only by about 10% in the Project Area, truck traffic would be about three times the 1985 level, and would be the major source of traffic noise. The highest peak-hour traffic noise level in the Project Area would be 80 dBA, L_{eq} and the minimum would be 64 dBA, L_{eq}. Noise levels would be indistinguishable from other Alternatives due to differences of less than three dBA, except along Mariposa Street where the roadside noise analysis indicates a three-dBA increase due to a 15-fold increase in peak-hour truck traffic. Compared to other Alternatives, Alternative N would result in noticeable increases in noise level, relative to existing conditions, over the largest portion of the Project Area because of the greater percentage of truck traffic. Areas adjacent to Third Street, south of Fourth Street, would be exposed to peak-hour traffic noise levels up to 80 dBA, L_{eq}. The intersection of Townsend and Fourth Streets would be exposed to traffic noise levels up to 76 dBA, L_{eq}. A 10-dBA increase (a perceived doubling) in the noise level would occur along Mariposa

Street between Minnesota and Illinois Streets. The lowest peak-hour traffic noise level, 66 dBA, L_{eq}, would be found along China Basin Channel.

Open spaces along China Basin Channel would be among the quietest areas in the Project Area. The lowest noise level estimated by the composite noise analysis, 66 dBA, L_{eq}, is located midway between Sixth and Fourth Streets, along Channel Street. Toward each end of Channel Street, noise levels would increase because of vehicle traffic.

Non-Traffic Noise

Relative to traffic noise levels, non-traffic noise would be more random in its occurrence, typically of shorter duration, and wider in the range of noise levels produced. Non-traffic noise may occur at any time of day and include intrusive noise from whistles and machinery. Existing sources of Project Area noise other than traffic include industrial/commercial process noise and miscellaneous noise. The primary non-traffic noise is from maritime activities along the shoreline east of Third Street, passenger and freight trains at the CalTrain station and along the associated rail lines, and various industrial processes. During the course of Project Area development, some of these noise sources would remain in the Project Area and continue to add to the background noise level of the area, while others would be eliminated. That transition is described in VI.B. Land Use, Business Activity and Employment, p. VI.B.93. This section identifies noise sources that would remain during development, and describes the noise levels that would be produced by them.

Alternative A

No existing businesses would remain in the Project Area by 2020. Prior to 2020, existing businesses east of Third Street, between 16th and Fourth Streets, and those south of 16th Street could still be present. The Kaiser Sand and Gravel concrete manufacturing plant now occupies the area east of Third Street between 16th and Fourth Streets. Noise levels measured in the vicinity of this plant, and reported in Table VI.G.2, p. VI.G.9, reached a high of 103 dBA, with a 24-hour average noise level of 75 dBA, L_{eq}./13/ Noise at that level would continue after occupancy of commercial and residential uses in the Project Area and would affect residents along Third Street. Maximum interior noise levels at MDR housing across Third Street from the plant could reach 87 dBA, L_{eq} with the windows open. Warehouses are located south of 16th Street, so trucks would be the primary future noise source. Truck noise and its effects on noise sensitive receptors are discussed above in Traffic Noise and Construction Noise.

Non-traffic operational noise sources would include maritime activities at the pier areas, but those sources would gradually be replaced with commercial and recreational development along the shoreline. Some maritime businesses may have relocated to bayfront areas south of the Project Area, where their presence would produce noise levels similar to those measured and reported in Table VI.G.1, p. VI.G.6. Were maritime activities to remain on the piers, they could produce peak outdoor noise levels of 94 dBA, L_{eq}, as shown in Table VI.G.1, p. VI.G.6. Intermittent intrusive noise of that magnitude would be superimposed on the background noise level of about 70 dBA, L_{eq} in the area of the proposed park at China Basin (OS-1) and would detract from enjoyment of the area. In addition, if housing planned for the area east of Third Street were completed and inhabited prior to the relocation of maritime facilities, these residents could be exposed to intermittent interior noise levels up to 84 dBA, L_{eq}, if windows were open. Noise at that level would be annoying and would interfere with conversation and daytime sleep. The open space corridor with biking and walking path (OS-11) planned for the area between the Port-related/M-2 and MDR land uses would have no effect on noise levels from the port area because of its narrow width (about 25 feet). The anticipated mix of commercial and residential land uses would probably not present new noise sources that would be noticeable above the relatively noisy background levels expected. In other portions of the Project Area, noise-generating land uses could locate in S/LI/RD space.

Relocation of the CalTrain commute station to an area near Seventh and Channel Streets would not significantly affect average noise levels at the new station location, because trains currently pass that location and generate noise while accelerating and decelerating. Relocation would reduce noise levels along the segment between the new station and the old station at Townsend and Fourth Streets, because railroad use would cease there.

Noise-sensitive receptors within the Project Area closest to the new CalTrain station would be houseboat residents and residents of MHDR along Owens Street. Maximum outdoor noise levels at the houseboats could reach 72 dBA, L_{eq} from the intermittent noise of train accelerations and decelerations; instantaneous noise levels from train whistles, could reach 87 dBA, which would be intrusive. These noise levels would be similar to those produced by trains under existing conditions. Houseboat residents would continue to be exposed to unattenuated noise, because there would be no buildings to shield them from CalTrain activities, and the station itself would not shield noise from locomotives. Noise levels within houseboats could reach 62 dBA, L_{eq}, for short periods which would interfere with conversation.

Recreational users of the 0.5-acre open space planned for beneath the I-280 overpass (OS-8) would be exposed to CalTrain noise levels up to 70 dBA, L_{eq}. Noise at nearby MHDR would be partially attenuated by the planned S/LI/RD development between the railyard and Owens Street. Still, indoor noise levels in the housing development could reach 52 dBA, L_{eq}, if windows were open during periods of rail activity. This noise could be reduced to 37 dBA, L_{eq} or lower by closing the windows. Interior noise levels at the S/LI/RD buildings could reach 78 dBA, L_{eq}, if windows were open. If windows were closed, or not installed on the rail side of the building, interior noise levels could be reduced to below 53 dBA, L_{eq}.

MUNI Metro light rail vehicles (LRVs) and buses would be additional sources of noise in the Project Area. Noise levels from buses and trolleys measured at 35 feet range from 70 dBA, L_{eq}, for electric buses, to 85 dBA, L_{eq}, for diesel buses./14/ Articulated buses and MUNI LRVs reportedly generate noise levels up to 82 dBA, L_{eq}./14/ No noise-sensitive receptors would be located along the proposed King Street line in Alternative A, but residents of Owens Street housing may be exposed to outdoor noise levels from accelerating diesel buses of up to 86 dBA, L_{eq} at 35 feet. Interior noise levels, with windows open, could reach 76 dBA, L_{eq}, at streetfront residences, which would interfere with conversation and potentially cause physiological effects such as changes in motor coordination because of the intermittent nature of the noise.

Alternative B

Under Alternative B, at build-out most of the Project Area would be devoted to residential uses and open space. No port-related maritime land use would remain in the Project Area east of Third Street. Existing pier activities would produce noise and affect nearby open space and residents, as described for Alternative A, were they to remain after development of those areas.

Housing located along Owens Street would be affected by noise from the relocated CalTrain commute station. Residents would benefit from shielding to be provided by planned retail development along Hooper Street and the office space planned for Owens

Street. Maximum interior noise levels at MDR in that area could reach 52 dBA, L_{eq} with windows open, as expected for Alternative A. Houseboat residents would be exposed to high noise levels, as described for Alternative A.

MUNI Metro service planned for this Alternative would expose noise-sensitive receptors to noise as described for Alternative A. Under Alternative B, however, residents of MDR along King Street would also be exposed to this noise source. As described for Alternative A, MUNI Metro vehicles could generate noise levels up to 86 dBA, L_{eq} at 35 feet. King Street residences could be exposed to interior noise levels of 76 dBA, L_{eq} with windows open, with effects as described for Alternative A.

Alternative N

Land uses similar to current uses, but of increased density, would occupy the entire Project Area in 2020 under Alternative N. Commercial and industrial activities could produce noise levels similar to those presented in Table VI.G.1, p. VI.G.6. If piers adjacent to the Project Area continued to be attractive for maritime use, noise from these activities would be similar to that described for Alternative A. There would be no new noise-sensitive receptors in the area.

Noise sources such as passenger trains, trolleys, and buses from the CalTrain and ship repair at Piers 50 and 54, and heavy equipment operation would remain. Background noise levels from those sources would range from 50 to 61 dBA, L_{eq} at night and 60 to 69 dBA, L_{eq} during the day, with occasional intrusive noise events of up to 100 dBA, L_{eq} from train horns and whistles. The extension of MUNI Metro to the CalTrain Station at Fourth and Townsend Streets would increase noise levels to about 86 dBA, L_{eq}, on King Street as described in Alternative A. MUNI Metro noise would not affect any noise-sensitive receptors in the Project Area.

The only noise-sensitive receptors likely to be affected by noise from those sources would be houseboat residents and users of open space along the channel. Indoor noise levels could reach 59 dBA, L_{eq} at houseboats during the day. Average daytime noise levels in the open space could reach 69 dBA, L_{eq}, which would be disturbing. Tenants of Washington Hotel, on the periphery of the Project Area, probably would not be exposed to higher noise levels than now exist.

NOISE STANDARDS, PLANS AND POLICIES

Title 24 Noise Insulation Standards

On the basis of noise measurements reported in Table VI.G.1, p. VI.G.6, acoustical analyses would be required prior to construction of any multi-family housing in the Project Area under Alternatives A and B to demonstrate that annual average interior noise levels in habitable rooms would be less than 45 dBA, CNEL with the windows closed. The analyses in this EIR do not assume that Project Area buildings would be built to that specification. Interior noise levels have been reported on the assumption that windows would be open and that, if closed, a maximum attenuation of 35 dBA, L_{eq} would result./9/

San Francisco Noise Ordinance

As shown in Tables VI.G.3 and VI.G.4, pp. VI.G.12, and VI.G.13, construction noise levels excluding the use of impact tools could exceed 80 dBA, L_{eq} 100 feet away from construction sites. This temporary noise source would be present at various times and sites throughout the approximately 30-year development of the Project Area under all Alternatives. That level of noise would not be in compliance with the standards of the San Francisco Noise Ordinance (Section 2907b), and would require noise abatement measures as described in the Mitigation section, p. VI.G.30.

Environmental Protection Element

The Element includes the City of San Francisco's Plan for Transportation Noise Control. A primary objective of the Plan for Transportation Noise Control is to minimize the impact of transportation noise on affected areas through site planning and use of special construction materials where necessary./15/ The roadside traffic noise analysis prepared for this EIR indicates that Alternatives A and B would not respond to that objective. Residences fronting on Third Street and Fourth Street would be exposed to outdoor noise levels of up to 79 dBA, L_{eq} and 72 dBA, L_{eq}, respectively. Residences along Townsend Street in Alternative B would be exposed to outdoor noise levels of up to 68 dBA, L_{eq}. Although indoor noise levels could be reduced to 44 dBA with the use of proper construction materials, outdoor activities would be impaired by exposure to this level of noise./8/

Placement of S/LI/RD buildings in the area between 16th and Mariposa Streets near Third Street for Alternative A would provide a more compatible noise environment than the placement of residential units there, as planned for Alternative B. That area is expected to experience the highest noise level increases, and is already exposed to some of the highest noise levels in the Project Area, particularly near Third Street, as shown in the results of the composite traffic-noise modeling in Appendix G. Table XIV.G.2, p. XIV.G.6. The quietest portions of the Project Area under any Alternative would be along the southern shoreline of China Basin Channel and the eastern waterfront, where noise levels would range from 62 to 65 dBA, L_{eq} (see Table XIV.G.2, p. XIV.G.6. Residential uses in those areas, as planned for Alternatives A and B, would be compatible and would respond to the objective. Outdoor noise levels in these areas could still interfere with normal conversation during the peak traffic period.

Another objective of the Plan for Transportation Noise Control is to promote land uses that are compatible with transportation noise levels. To make comparisons to the City's Land Use Compatibility Chart (see Figure VI.G.1, p. VI.G.4), day-night noise levels (L_{dn}) are needed. Those levels were reported in Table VI.G.1, p. VI.G.6. The minimum level measured in the Project Area was 68 dBA, L_{dn}; the maximum was 79 dBA, L_{dn}. According to the Land Use Compatibility Chart, those noise levels generally indicate that construction of new housing should be discouraged in the Project Area. If housing were built, the Plan for Transportation Noise Control would require that a detailed analysis of noise-reduction requirements be performed and that needed noise insulation features be included in the design.

Under the Plan for Transportation Noise Control, all portions of the Project Area also would require detailed analysis of noise-reduction requirements for office buildings; noise insulation would need to be included in the design. Commercial land use (other than offices) would be compatible with this objective throughout the Project Area without special noise insulation requirements, except for Third Street between Fourth and 16th Streets, where a detailed analysis of noise reduction requirements would be required, with noise insulation features included in the design.

MITIGATION

There are three approaches to reducing the level of noise to which receptors are exposed: reduce the sound level at the source, provide the receiver with shielding, and alter the path along which the sound is transmitted. Mitigation Measures G.1, G.2, and G.3, address the first method. Mitigation Measures G.4, G.5, and G.6 focus on means to protect receptors from high noise levels. These measures include use of building materials that reduce noise and site planning to locate noise-sensitive land uses in areas of lower noise levels. Finally, Mitigation Measures G.7, G.8, and G.9 suggest the use of barriers and berms as means to impede the transmission of noise. None of the following measures is intended to be exclusive to any other; they should be used together as appropriate and feasible.

Measure	Alternative	Description
G.1	A,B,N	During construction, comply with the San Francisco Noise Ordinance (Section 2907b), which requires that each piece of powered equipment, other than impact tools, emit a sound level of not more than 80 dBA at 100 feet. To reduce impacts from non-pile driver construction noise, require the general contractor to implement the following measures: muffle and shield intakes and exhausts, shroud or shield impact tools such as jackhammers and use electric-powered rather than diesel-powered construction equipment, as feasible, so that noise would not exceed limits stated in San Francisco's Noise Ordinance (Article 29, San Francisco Administrative Code, 1972). Construct barriers around the site and around stationary equipment, such as compressors, which would reduce construction noise by as much as five dBA. Locate stationary equipment in pit areas or excavated areas, as these areas would serve as noise barriers. In general, the most important noise control device for power equipment is an optimal engine exhaust muffler. With feasible noise control such as that, most equipment

Measure	Alternative	Description
		can be quieted by up to 10 dBA, L_{eq}. If the noisiest piece of equipment used to calculate the noise levels presented in Table VI.G.4 were quieted by 10 dBA, L_{eq}, the loudest phase of construction would be excavation and finishing at 76 dBA, L_{eq} at 50 feet. Assuming that the closest receptor would be about 100 feet away, indoor noise levels, with windows open, would still reach about 60 dBA, but with windows closed, could be quieted to 35 to 45 dBA, L_{eq}, depending on the quality of building material and window type.
G.2	A,B,N	The operation of pile-drivers is regulated in Section (2907c) of the San Francisco Noise Ordinance, which enables the City to order special abatement procedures, such as equipping the machines with intake and exhaust mufflers, predrilling of pile holes, erection of enclosures around the point of impact, use of vibratory pile driving and restricting the hours of operation, in order to reduce the levels and duration of exposure. Although noise reductions of 20 to 30 dBA may be achieved with use of one or more of these measures, all quieting methods are not applicable to each construction site. Means to quiet pile-driving noise should be discussed with the engineers in charge of construction.
G.3	A,B,N	Vehicle traffic throughout the Project Area represents the major source of existing and future noise. Although the City cannot control the level of noise produced by privately owned vehicles, it can control which City-owned transit vehicles are used in the Project Area, where the routes are located, and how tracks are installed. If possible, the MUNI electric bus should be used because it has been shown to be the quietest. MUNI Metro light-rail

Measure	Alternative	Description
		vehicles (LRVs) are generally quieter than diesel buses and trucks, and proper track installation can reduce noise and vibration by up to 15 dBA.
G.4	A,B,N	Shield noise-sensitive receptors from long-term high noise levels that reach the exterior of their living and working spaces. Common shielding methods include increasing the thickness and stiffness of the wall or window, inserting an air space within the wall or window, increasing the thickness of the air space, widening the spacing between wall studs, staggering wall studs so that none are attached to both interior and exterior panels, and using resilient/noise absorbing materials within walls. The ability of various wall and window designs to attenuate noise is presented in note 9, p. VI.G.38. These noise attenuating abilities will be reduced by the presence of doors, vents, mail slots, open windows, and other cracks or holes. Such openings should be avoided on walls that are exposed to high noise levels. If windows are present, they should be permanently sealed and mechanical ventilating systems should be used. If doors are located on these walls, they should be solid core, floors should be carpeted, a vinyl seal should cover the door-to-door frame air space, and a threshold closer should be installed. Some of these improvements could increase the cost of residential development.
G.5	A,B,N	Use site planning considerations to help prevent high noise levels from reaching the exterior walls of living spaces. Simple architectural design approaches, such as placing less noise sensitive spaces such as corridors, storage areas, bathrooms, and kitchens on exterior walls, where appropriate, would provide additional mass and air space

Measure	Alternative	Description
		for noise attenuation. Bedrooms and living rooms would then face away from the major noise sources (such as Third and Fourth Streets). In addition to careful planning of interior spaces relative to noise sources, design entire buildings to prevent or impede noise reaching outdoor common areas and indoor noise-sensitive areas. Buildings should present barriers to noise sources and "open" onto areas that do not contain noise sources. Where feasible, the distance between source and receptor could be increased, although noise reductions are small (3 to 4.5 dBA, depending on the hardness of the ground surface) for each doubling of distance from mobile noise sources. Noise-compatible land uses such as parking areas, utility and maintenance facilities, and some types of open space, could be located between noise sources and sensitive receptors.
G.6	A,B	Move housing from areas along Third Street to portions of the Project Area identified as being exposed to lower future noise levels, primarily along China Basin Channel. Third Street would continue to be the noisiest corridor in the Project Area. If housing cannot be moved from this area, ground-floor residences should be discouraged and replaced with commercial or retail uses. This replacement could occur along other traffic corridors where residences are planned, such as Fourth Street between the channel and Third Street, and along Mariposa Street, for Alternatives A and B, and along Townsend Street for Alternative B. This measure could affect the ability to maintain the housing programs included in the Alternatives, or could lead to higher housing densities in greater areas of the site.

Measure	Alternative	Description
G.7	A,B,N	Construct barriers other than buildings to lessen the magnitude of noise levels that would reach building exteriors. Earthen spoils from building excavations could be used to create berms along streets that would shield open spaces from noise sources.
G.8	A,B	Use earthern berms along Third Street to help alleviate the exposure of Third Street residents to vehicle traffic noise levels. Earthen berms may attenuate noise levels within property lines by up to 23 dBA. Alternatively, set housing units back from Third Street and establish less noise-sensitve land uses at ground level. Concentrate common areas such as laundry facilities, storage, and maintenance / service areas along the sides exposed to vehicle traffic at the upper-level.
G.9	A,B	Protect houseboat residents of the channel from high noise levels from the relocated CalTrain station by providing earthern berms or walls at some point between the station and the channel. Placement of such structures on the northern side of Owens Street would also help to reduce traffic noise originating there.

NOTES

SETTING

/1/ Environmental noise is measured in units of decibels (dB). The dBA, or A-weighted decibel, refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. The normal range of human hearing extends from about 10 dBA to about 140 dBA. A 10-dBA increase in the level of a continuous noise represents a perceived doubling in loudness; a 3-dBA increase is barely noticeable to most people, outside of laboratory conditions. Speech is typically about 60 to 65 dBA.

Environmental noise fluctuates in intensity with time, and is typically described as a time-averaged noise level. The three descriptors of noise used herein are L_{eq}, L_{dn} and L_{max}. L_{eq}, the energy equivalent noise level, is a measure of the average energy content (intensity) of noise over a given period. L_{dn}, the day-night average noise level, is an index, based on a 24-hour average, of the energy content of the noise, with a ten-dBA "penalty" added for nighttime noise (10:00 p.m. to 7:00 a.m.), to account for the greater sensitivity of people to noise during this period. The L_{max} is the peak noise intensity measured during a given period of time.

CNEL, the Community Noise Equivalent Level, is similar to the L_{dn} but with an additional five dBA "penalty" added to evening noise (7:00 p.m. to 10:00 p.m.). In practice, L_{dn} and CNEL values for the same noise event usually differ by less than two dBA.

/2/ These bus lines, the 30-STOCKTON, 15-THIRD, 42-DOWNTOWN LOOP, and 32-EMBARCADERO, are described in detail in VI.E. Transportation, p. VI.E.14.

/3/ The afternoon peak period for CalTrain is between 3:00 p.m. and 5:55 p.m., and evening peak hour is between 4:50 p.m. and 5:50 p.m. Afternoon peak direction is from San Francisco to San Jose. During this period, ten trains leave San Francisco for San Jose and six trains leave San Jose for San Francisco. Morning peak period is between 6:10 a.m. and 8:40 a.m., and morning peak hour is between 7:40 a.m. and 8:40 a.m. Morning peak direction is from San Jose to San Francisco. Eight trains leave San Jose for San Francisco during the morning peak period and four trains leave San Francisco for San Jose during this period. CalTrain: Peninsula Timetable, April 3, 1988.

/4/ Noise generated at the Third Street Bridge includes warning bells and a siren to alert vehicular traffic of the bridge's operation, and a siren to alert navigational craft of the bridge's operation. Noise generated at the Fourth Street Bridge includes two sirens, to alert vehicular and navigational traffic of the bridge's operation. The Third Street Bridge is raised and lowered approximately 40 to 45 times a month, and the Fourth Street Bridge is raised and lowered approximately 25 times a month; both bridges operate 24 hours per day. (Patrick Petersen, Station Engineer, San Francisco Department of Public Works, telephone conversation, February 21, 1986).

/5/ San Francisco Department of City Planning, Pier 50 Drydock Negative Declaration, 84.124E, San Francisco, California, September 7, 1984.

/6/ The Federal Highway Administration Model SNAP1 was used to model roadside noise levels from vehicle traffic along 11 road segments. Total peak-hour vehicle volumes used for the modeling were derived from VI.E. Transportation, Figure VI.E.3, p. VI.E.9. The traffic counts that generated those numbers were conducted by Barton-Aschman Associates in October and November of 1985. All trucks were assumed to be "heavy" trucks, a worst-case assumption. Truck percentages were taken from information provided by Barton-Aschman Associates. Vehicle speeds were also provided by Barton-Aschman, although the anticipated 25 mph vehicle speed within the Project Area, which was used in the Air Quality Analysis, was below the minimum speed of 31 mph allowed by the SNAP1 model. Barton-Aschman's suggested speed of 45 mph for I-280 traffic was used for traffic along that segment, but 31 mph was used within the Project Area. The effect of inflating the vehicle speed from 25 to 31 mph was to increase vehicle noise levels by about three dBA, and truck noise levels by about two dBA. The inflated vehicle speed, therefore, provides a worst-case estimate of Project Area traffic noise levels. The noise modeling did not take into account the possibility that some portions of the Project Area would be shielded from traffic on major thoroughfares by buildings and other structures, which can reduce noise from a line source such as a road by about eight to ten decibels. Further information regarding the noise modeling is provided in Appendix G. p. XIV.G.3.

/7/ U.S. Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, Report #550/9-74-004, March 1974.

IMPACT

/8/ Noise levels above 75 dBA, L_{eq} have been shown to interfere with 100% of normal conversation when the speakers are within two meters (about six feet) of each other. The following table (Jack Golden, et al., Environmental Impact Data Book, Ann Arbor Science Publishers Inc., Ann Arbor, Michigan 1979 and U.S. Department of Housing and Urban Development, The Noise Guidebook, Washington, D.C., March 1985) shows other potential effects of noise levels on people:

Decibels (dBA)	Examples	Potential Effect/ Perceived Noise Level
0	Threshold of hearing	Very faint
10	Rustle of leaves in wind	Barely audible
20	Average whisper/broadcast studio	Very faint
30	Average residence without stereo playing	Faint - slight sleep interference
40	Soft radio music in apartment, refrigerator, light traffic at 100 feet	Faint - moderate

(continued)

Decibels (dBA)	Examples	Potential Effect/ Perceived Noise Level
50	Average office, Quiet conversation at 10 feet	Moderate
60	Normal speech level, air conditioner	Moderate - loud
65	Urban residential, electric typewriter at 10 feet	Loud - communication interference annoyance threshold
70	Vacuum cleaner, Average traffic at 100 feet	Smooth muscles/glands react
75	Office with tabulating machines	Changed motor coordination
80	Freeway traffic at 50 feet, garbage disposal	Moderate hearing damage (continuous exposure)
85	Construction/noisy city	Very annoying
90	Propeller plane flyover at 1,000 feet, food blender, diesel truck at 25 feet	Prolonged exposure affects mental and motor behavior
95	Freight train at 50 feet	Severe hearing damage after four hours per day exposure for extended periods
100	Loud auto horn at 10 feet	Very loud, hearing damage after two hours per day exposure for extended periods
110	Accelerating motorcycle at 20 feet	Hearing damage after one-half hour per day exposure for extended periods
115	Maximum vocal effort, discotheque	Deafening
125	Jet take off at 200 feet	Pain threshold

/9/ The reductions of exterior noise levels achieved by the specific building types (FHWA Policy and Procedures Memorandum 90-2, February 8, 1973) are shown below.

Building Type	Window Condition	Reduction of Exterior Noise Achieved by Building Type
All	Open	10 dB
Light Frame (houseboats, wood frame)	Ordinary sash, closed	20 dB
Concrete	Single pane, closed	25 dB
Concrete	Double pane, closed	35 dB

/10/ The evening peak hour typically occurs between 4:30 and 5:30 p.m. on weekdays.

/11/ Complete listings of the computer input and output are available for public review at the Department of City Planning, Office of Environmental Review, 450 McAllister Street.

/12/ Barton-Aschman Associates, Inc., "Mission Bay EIR Vehicle Demand Analysis," August 3, 1987, on file at the Department of City Planning, Office of Environmental Review.

/13/ Although a noise technician was not present during measurement of the 103 dBA, L_{eq} value, this probably was an instantaneous event associated with freight loading or unloading.

/14/ San Francisco, Department of City Planning, "Noise/Buffering: Mission Bay, San Francisco", Special Study for Mission Bay, September 4, 1986.

/15/ San Francisco Department of City Planning, Plan for Transportation Noise Control, Environmental Protection Element of the Master Plan, adopted by the City Planning Commission, Resolution 7244, September 19, 1974.

H. ENERGY

SETTING

LOCAL ENERGY SUPPLY AND DISTRIBUTION

Mission Bay is within the service area of Pacific Gas and Electric Company (PG&E). PG&E's service area covers 94,000 square miles in northern and central California, includes 48 of California's 58 counties, and has a population of more than ten million people. PG&E produces electricity from both renewable and non-renewable resources. PG&E also plans to rely on customer-owned generation (e.g., cogeneration), increased geothermal resources, and continued purchase of surplus hydroelectric power from the Pacific Northwest./1/ PG&E obtains natural gas from Alberta, Canada, Texas and California.

Electricity

San Francisco obtains electricity from PG&E and from the municipally owned and operated Hetch Hetchy Water and Power system. PG&E supplies electricity to private residential, commercial and industrial customers, while Hetch Hetchy provides power primarily for municipal operations.

Pacific Gas and Electric Company

Electricity is generated within San Francisco by two local gas-fired power plants, Hunters Point and Potrero, with a total capacity of about 792 Megawatts (MW)./2/ Interties with other portions of PG&E's service area and other utilities in the state enable the city to receive power from plants outside of San Francisco. The 23rd and Illinois Street (Potrero) substation distributes electricity to five above-ground and ten underground power lines that serve the Project Area and its vicinity./3/ The Potrero substation has a capacity of 134.3 MW. PG&E plans, in the future, to serve portions of the Project Area and vicinity from its 74.5 MW - capacity Embarcadero Station at Folsom and Fremont Streets.

PG&E's total electrical capacity is about 16,600 MW, consisting of about 42% oil- or gas-fired plants; about 15% hydroelectric; about 19% nuclear; about 8% geothermal; about 7% pumped storage; and about 9% cogeneration, other sources, and purchases from other utilities./4,5/ The Diablo Canyon nuclear power plant provides about 70% of

PG&E's nuclear capacity; Unit One began supplying commercial power in May 1985 and Unit Two began operation in March 1986./5/ Helms Pumped Storage Hydroelectric Project, which began operation in December 1983, and San Luis Reservoir provide the pumped-storage hydroelectric component of PG&E's system./4,6/ PG&E purchases some electricity from other utilities, mostly inexpensive surplus hydroelectric power from Washington and Oregon. PG&E will continue purchasing surplus hydroelectric power as long as it is available and inexpensive./4/ By 1996, according to forecasts prepared by the California Energy Commission (CEC), PG&E will need an additional 3,200 MW of capacity; load management will become an important consideration in minimizing peak demand for electricity./7/

Hetch Hetchy Water and Power

Hetch Hetchy Water and Power, a municipally owned water and electric system, is operated by the City and County of San Francisco under provisions of the Raker Act (38 Stats. 242, 1913). While recognizing certain pre-existing rights of the Modesto and Turlock Irrigation Districts, the Raker Act established the rights of San Francisco to obtain both water and power from the Tuolumne River.

The Hetch Hetchy system generates electricity from three hydroelectric facilities on Tuolumne River and Cherry Creek in the Sierra Nevada. Total Hetch Hetchy capacity is 339 MW, generated by the Moccasin Powerhouse (104 MW), Holm Powerhouse (150 MW) and Kirkwood Powerhouse (85 MW)./8/ San Francisco receives Hetch Hetchy power via the PG&E transmission and distribution system.

Approximately 95% of the power generated by Hetch Hetchy is consumed by the City and the Modesto and Turlock Irrigation Districts, with about one-third of this going to the City (including San Francisco International Airport and its tenants, the largest municipal consumer) and about two-thirds going to the Modesto and Turlock Irrigation Districts./8/ The remaining 5% is sold to miscellaneous "assigned" industrial customers.

Natural Gas

PG&E distributes natural gas to San Francisco from one gas storage tank on Pennsylvania Avenue about one-quarter mile south of the Project Area. This tank is scheduled to be dismantled after 1989, when PG&E's program of upgrading the capacity of the gas transmission lines supplying San Francisco will preclude the necessity for natural-gas storage within the City./9/ PG&E purchases, rather than produces, most of its natural gas. Its policy is to purchase first from non-California sources./1/ This policy, which helps preserve California's natural gas in case of shortages, will continue as long as it is economical. PG&E receives about 39% of its natural gas from Canada, about 39% from the southwestern United States and about 22% from California./4,5/

Steam

PG&E's only district steam heating system consists of natural-gas-fired boilers at two facilities, Stations S and T, and steam distribution lines serving portions of the C-3 District./10,11/ Station S, built in 1913 at Sutter and Hyde Streets, has a capacity of 130,000 pounds (lb.) of steam per hour and 2.8 miles of low-pressure distribution lines. Station T, built in 1924 at Sixth and Jessie Streets, has a capacity of 360,000 lb. of steam per hour and 9.9 miles of high-pressure distribution lines. The steam system supplies about one billion Btu of steam heat per year to about 280 commercial customers. Located about 0.75 miles from the Project Area, the steam system is being upgraded and expanded.

Liquid Fuels

Private vehicles and public transit serving the Project Area, such as buses and CalTrain, purchase gasoline and diesel fuel from a variety of distributors in the San Francisco area.

ENERGY DEMAND AND CONSUMPTION

Electricity

Commercial and industrial uses in the Project Area currently consume an estimated 11.6 million kilowatt-hours (kWh) of electricity, or about 119 billion Btu, per year./12,13,14/ Assumptions upon which this estimate is based are shown in Appendix H. Energy, Table XIV.H.1, p. XIV.H.1. Most of this energy is used for industrial applications, including lighting and operation of power equipment for the production, maintenance, storage, and repair of goods and equipment. Some energy is consumed for commercial and office purposes; these uses consist primarily of lighting, heating, air conditioning, and computer operations. Electricity demand in the Project Area and vicinity peaks at about 10.3 MW, or about 7.6% of the capacity of the Potrero Substation./4/ Peak demand typically occurs in summer, at about 12:00 noon.

Citywide consumption of electricity is about 3.8 billion kWh annually./15/ Peak demand for electricity is about 785 MW./2/ Citywide electrical demand had historically peaked in winter, whereas PG&E's system-wide demand usually peaks in summer./10/ In the 1970s, however, citywide summer demand increased more rapidly than winter demand, probably due to the large amount of commercial development, combined with conversion of residential space heating from electrical to natural gas./10/ Citywide demand now usually peaks in August or September, coincident with system-wide demand, when temperatures are the warmest./15/ In 1985, peak demand generally occurred from noon until 2:00 p.m. in October, due to unseasonably warm weather.

Electricity provides about 57% of the energy consumed in the PG&E service area. Consumption increased at about 2% per year between 1975 and 1985, and is currently about 64.7 billion kWh./5/ Peak demand, which determines PG&E's generation and distribution capacity, is about 16,500 MW; PG&E's reserve margin is about 8% of peak demand./4,5,16/ A reserve margin of 5% or less triggers statewide energy emergency plans./7/

Natural Gas

Natural gas use in the Project Area is about 37 million cubic feet, or about 41 billion Btu, per year./14/ Assumptions upon which this estimate is based are shown in Appendix H. Table XIV.H.1, p. XIV.H.1.

About 35 billion cubic feet of natural gas are consumed in the City annually. Peak daily demand is about 292 million cubic feet, about 8% of the service area demand./2/ In 1985, the peak day was Friday, December 27./2,4/ Peak-hour demand was 17 million cubic feet and occurred from 9:00 to 10:00 a.m. on December 27. Natural gas is used primarily for space and water heating, although the amount used for air conditioning is increasing./10/ Consumption of natural gas in the PG&E service area is about 492 billion cubic feet per year./4/ Peak demand in the service area, which normally occurs in January, is about 3.7 billion cubic feet per day./15/

Transportation Energy

In 1985, automobiles provided about 53 million vehicle-miles per year of travel between the Project Area and outlying areas, using about 2.8 million gallons of gasoline and about

100,000 gallons of diesel./17/ The overall source energy requirement of about 420 billion Btu annually to provide about 71 million passenger-miles of travel is about 5,900 Btu per passenger mile.

ALTERNATIVE ENERGY RESOURCES

The potential exists in the Project Area and vicinity for developing alternative, or unconventional, power sources such as district heating and cooling, cogeneration or solar energy collection systems. District heating and cooling, which would provide thermal energy to residential and commercial buildings from a central plant, cogeneration, passive solar design, and daylighting could reduce energy use in appropriately designed structures. The energy conservation potential in the Project Area is a resource that will be affected by future development.

ENERGY CONSERVATION POLICIES, REGULATIONS AND ORDINANCES

Rising energy costs and energy shortages have led to general concern for energy conservation. At the state level, Title 24 of the California Administrative Code regulates the energy efficiency of buildings and Title 20 regulates the energy efficiency of appliances. California's Solar Rights Act, which added Section 66473.1 to the State Subdivision Map Act, requires that subdivision designs provide, to the extent feasible, for future passive or natural heating or cooling opportunities. At the local level, elements of the City's Master Plan, the City Administrative Code, and related policies establish energy conservation measures.

The Energy Component of the Environmental Protection Element of the Master Plan is the basis for local energy management, providing a general policy framework to direct both public and private decisions on energy use. Specific energy conservation measures for the city were developed by the Citizens' Energy Policy Action Committee (CEPAC), appointed by the Mayor in 1981 to study energy problems and to recommend energy conservation measures. CEPAC's final report was adopted as the local energy conservation action program. An energy management committee, composed of representatives from the public and private sectors, was established to carry out the recommendations of CEPAC for the commercial sector. A district-heating committee has been established to provide recommendations on both PG&E and municipal heating systems.

New buildings in San Francisco must comply with Title 24 through either its prescriptive or its performance standards. Prescriptive standards ensure energy efficiency through required building design features. Performance standards are allowable annual energy budgets which, if met, exempt a building from some prescriptive requirements. The State Title 24 regulations are enforced in San Francisco by the Department of Public Works, Bureau of Building Inspection, through the building permit review process.

IMPACT

CONSTRUCTION ENERGY

Construction of buildings and infrastructure would require both direct and indirect expenditures of energy. Direct energy is directly consumed by an activity. For example, the refined petroleum products needed to operate construction equipment would be a direct energy expenditure. Indirect energy is consumed through sectors that provide inputs to an activity, rather than energy consumed by the activity itself. For example, the use of a steel beam in construction indirectly represents energy consumed in all of the industries that contributed to the production of the beam (e.g., energy consumed through mining and extraction of raw materials, manufacturing, and transportation). Indirect energy typically represents about three-quarters of total construction energy, while direct energy represents about one-quarter of total construction energy./18/ Total energy that would be consumed through new construction associated with each Alternative is shown in Appendix H., Energy, Tables XIV.H.2-XIV.H.4, pp. XIV.H.2-XIV.H.4.

2000

Alternative A

New construction associated with Alternative A would consume approximately 6,000 billion Btu of energy from 1986 through 2000./19/ That energy, representing both direct energy consumed on-site and indirect energy embodied in the various materials used, would be equivalent to the energy content of approximately one million barrels of crude oil.

Alternative B

Approximately 3,400 billion Btu of energy would be consumed in the construction of Alternative B through 2000./19/ That would be equivalent to about 590,000 barrels of crude oil.

Alternative N

Construction through 2000 would represent approximately 2,400 billion Btu, equivalent to about 410,000 barrels of crude oil./19/

Build-Out/2020

Alternative A

New construction associated with Alternative A between 2001 and 2020 would consume about 9,600 billion Btu of energy, for a total of about 15,600 billion Btu expended by build-out./19/ That energy expenditure would be equivalent to approximately 1.7 million barrels of crude oil between 2001 and 2020, and a total of 2.7 million barrels of crude oil for project build-out.

Alternative B

Construction of Alternative B would require about 5,100 billion Btu of energy from 2001 through 2020, and a total of 8,500 billion Btu by build-out./19/ That energy expenditure would be equivalent to approximately 880,000 barrels of crude oil for the period from 2001 through 2020, and a total of 1.5 million barrels of crude oil by build-out.

Alternative N

Construction associated with Alternative N for the period from 2001 through 2020 would consume approximately 5,500 billion Btu of energy, equivalent to about 950,000 barrels of crude oil./19/ Total construction energy consumption by 2020 would be about 7,900 billion Btu, equivalent to about 1.4 million barrels of crude oil./19/

OPERATIONAL ENERGY

New development in Mission Bay would increase electricity and natural gas consumption in the Project Area and contribute to increased energy consumption and demand in San Francisco and PG&E's service area. Most of the electricity in Mission Bay would be used for lighting and heating, ventilating, and air conditioning (HVAC). A lesser amount would be consumed by electrical appliances. In Mission Bay, natural gas would be used primarily for space and water heating.

The total energy that would be consumed, and the proportion that would be supplied by electricity or natural gas, would vary among Alternatives in relation to the amount and mix of proposed land uses. In commercial land uses, especially office and similar types of land uses such as service, light industrial, and research and development, electricity generally would supply a higher proportion of total energy consumption than natural gas. Conversely, in residential land uses, natural gas typically would represent a higher proportion of total energy consumption than electricity (assuming use of natural gas for space and water heating). On a per-square-foot basis, commercial land uses would consume more electricity than residential uses, while residential uses would consume more natural gas. In terms of total at-source energy, commercial land uses, with their higher electrical consumption, generally would consume more energy per square foot than would residential land uses. Estimates of Mission Bay energy consumption are based on average historical energy consumption, and do not explicitly account for any future major changes in energy consumption patterns.

2000

Table VI.H.1 summarizes projected annual operational energy consumption for Mission Bay for each Alternative for the year 2000.

Mission Bay energy consumption would represent a substantial increase in energy consumption in the Project Area (see Table VI.H.1). It would add to city-wide and regional energy consumption as well, although its contribution would be proportionally lower when viewed in a city-wide or regional context. San Francisco's cumulative operational electricity consumption in 2000 is expected to be about five billion kWh (51 trillion Btu) per year, an increase in annual electricity consumption between 1985 and 2000 of about 1.2 billion kWh (12 trillion Btu)./20/ Mission Bay electricity consumption would represent about 5% of that growth under Alternative A, and about 3% of that growth under Alternatives B and N. Electricity consumption in PG&E's service area is expected to increase by about 30 billion kWh (310 trillion Btu) between 1985 and 2000./21/ Project-related electricity consumption would represent about 0.2% of that growth under Alternative A, and about 0.1% of that growth under Alternatives B and N.

San Francisco's natural gas consumption is expected to remain at about 35 billion cubic feet (39 trillion Btu) per year from 1985 through 2000./20/ Mission Bay natural gas consumption would thus represent an increase of less than 1% in citywide consumption.

TABLE VI.H.1: ANNUAL PROJECT AREA OPERATIONAL ENERGY CONSUMPTION BY ALTERNATIVE, 1985 AND 2000/a/

Annual Energy Consumption	1985	2000		
		Alternative A	Alternative B	Alternative N
Electricity				
kWh (in millions)	12	62	32	40
Btu (in billions)	120	630	330	410
Natural Gas				
Cubic Feet (in millions)	37	230	170	82
Btu (in billions)	41	250	190	90
Total				
Btu (in billions)	160	880	520	500

NOTE: Totals may not add due to rounding (entries rounded to two significant digits).

/a/ Based on commercial energy consumption factors as adapted from unpublished information provided by the California Energy Commission (Hoang Dang Nguyen, Research Economist, California Energy Commission, April 24, 1987), residential energy consumption factors from the San Francisco Department of City Planning, Energy Conservation Potential for Natural Gas and Electricity: 1980-1990, 1981, and floor areas contained in Table V.1, p. V.8 in Chapter V. The EIR Alternatives and Approval Process. See Appendix H. Tables XIV.H.5-XIV.H.7, pp. XIV.H.5-XIV.H.7, for calculations and consumption factors.

SOURCE: Environmental Science Associates, Inc.

Natural gas consumption in PG&E's service area is projected to increase by about 230 billion cubic feet (250 trillion Btu) per year from 1985 to 2000./22/ Project-related natural gas consumption would represent 0.1% or less of that increase in consumption under all Alternatives.

Alternative A

Annual operational energy consumption in 2000 under Alternative A would be about 62 million kWh (630 billion Btu) of electricity and about 230 million cubic feet (250 billion Btu) of natural gas./23/ The total annual operational energy consumption would represent an at-source energy content of about 880 billion Btu per year, equivalent to about 150,000 barrels of crude oil. Electricity consumption in the Project Area would be equivalent to about 1.6% of the electricity currently consumed in the City, and about 0.1% of the electricity currently consumed in the PG&E service area. It would represent about 5% and 0.2% of projected growth in electricity consumption in San Francisco and the PG&E service area, respectively, to the year 2000. Natural gas consumption would represent about 0.7% of existing consumption in the City, and less than 0.1% of existing consumption in the PG&E service area.

Alternative B

The land uses projected would consume about 32 million kWh (330 billion Btu) of electricity and about 170 million cubic feet (190 billion Btu) of natural gas annually./23/ The total annual operational energy consumption would be equal to about 520 billion at-source Btu per year, roughly equivalent to 90,000 barrels of crude oil. Annual Project Area electricity consumption in 2000 would be equivalent to about 0.8% of the electricity currently consumed in San Francisco, and less than 0.1% of the electricity currently consumed in the PG&E service area. It would be about 3% and 0.1% of projected growth in electricity consumption in the City and the PG&E service area, respectively. Natural gas consumption would be equivalent to about 0.5% of existing natural gas consumption in San Francisco, and less than 0.1% of existing consumption in the PG&E service area.

Alternative N

Annual operational energy consumption would be about 40 million kWh (410 billion Btu) of electricity and about 82 million cubic feet (90 billion Btu) of natural gas./23/ The total annual operational energy consumption would be equal to about 500 billion at-source Btu, equivalent to about 86,000 barrels of crude oil. Electricity consumed in 2000 would be equivalent to about 1.1% of the existing electricity consumption in San Francisco, and less than 0.1% of existing electricity consumption in the PG&E service area. It would be about 3% and 0.1% of City and service area growth in consumption. Natural gas consumption would be about 0.2% of existing natural gas consumption in the City, and less than 0.1% of existing natural gas consumption in the PG&E service area.

Build-Out/2020

Table VI.H.2 summarizes the projected annual operational energy consumption for each Alternative at build-out/2020. PG&E has not forecast energy consumption and demand for 2020./24/

TABLE VI.H.2: ANNUAL PROJECT AREA OPERATIONAL ENERGY CONSUMPTION BY ALTERNATIVE, 1985 AND BUILD-OUT/2020/a/

Annual Energy Consumption	1985	2020 Alternative A	2020 Alternative B	2020 Alternative N
Electricity				
kWh (in millions)	12	150	54	94
Btu (in billions)	120	1,500	550	960
Natural Gas				
Cubic Feet (in millions)	37	520	510	180
Btu (in billions)	41	570	560	200
Total				
Btu (in billions)	160	2,100	1,100	1,200

NOTE: Totals may not add due to rounding (entries rounded to two significant digits).

/a/ Based on commercial energy consumption factors as adapted from unpublished information provided by the California Energy Commission (Hoang Dang Nguyen, Research Economist, California Energy Commission, April 24, 1987), residential energy consumption factors from the San Francisco Department of City Planning, Energy Conservation Potential for Natural Gas and Electricity: 1980-1990, 1981, and floor area projections contained in Chapter V. The EIR Alternatives and Approval Process. See Appendix H., Tables XIV.H.8-XIV.H.10, pp. XIV.H.8-XIV.H.10, for calculations and consumption factors.

SOURCE: Environmental Science Associates, Inc.

Alternative A

Annual operational energy consumption in 2020 under Alternative A would be about 150 million kWh (1,500 billion Btu) of electricity and about 520 million cubic feet (570 billion Btu) of natural gas./23/ The total annual operational energy consumption would be equivalent to about 2,100 billion at-source Btu, or about 360,000 barrels of crude oil. Electricity consumed annually at project build-out would be equivalent to about 3.9% of the electricity currently consumed in San Francisco, and 0.2% of the electricity currently consumed in the PG&E service area. Natural gas consumption would represent about 1.5% of existing consumption in the City, and about 0.1% of existing consumption in the PG&E service area.

Alternative B

Operational energy consumption in 2020 under Alternative B would be about 54 million kWh (550 billion Btu) of electricity and about 510 million cubic feet (560 billion Btu) of natural gas per year./23/ The total annual operational energy consumption would be equal to about 1,100 billion at-source Btu per year, or about 190,000 barrels of crude oil. Annual Project Area electricity consumption in 2020 would be equivalent to about 1.4% of the electricity currently consumed in the City, and about 0.1% of the electricity currently consumed in the PG&E service area. Natural gas consumption would be equivalent to about 1.5% of existing natural gas consumption in San Francisco and about 0.1% of existing consumption in the PG&E service area.

Alternative N

Annual operational energy consumption in 2020 under Alternative N would be about 94 million kWh (960 billion Btu) of electricity and about 180 million cubic feet (200 billion Btu) of natural gas./23/ The total annual operational energy consumption would be about 1,200 billion Btu annually, equivalent to about 210,000 barrels of crude oil. Electricity consumed under Alternative N in 2020 would be equivalent to about 2.5% of existing electricity consumption in San Francisco, and about 0.1% of existing electricity consumption in the PG&E service area. Natural gas consumption would be about 0.5% of existing natural gas consumption in the City, and less than 0.1% of existing natural gas consumption in the PG&E service area.

ENERGY CAPACITY AND INFRASTRUCTURE

Energy demand could be supplied conventionally (i.e., by utility-provided electricity and natural gas), or could be supplemented or totally supplied by alternative energy systems. For example, PG&E and the project sponsor have looked into the feasibility of a district heating and cooling system for the Project Area. That type of system could provide thermal energy to residential and commercial buildings from a more-efficient central plant. (Refer to p. VI.H.21 for a discussion of a district heating and cooling system.) Following is a discussion of Project Area impacts on energy capacity and infrastructure, should energy be supplied conventionally.

2000

Electricity

The most important factor in determining electrical supply and distribution requirements is electrical demand, as opposed to total electricity consumption. Electrical demand refers to the amount of electricity being consumed at any one time; peak demand is the maximum demand occurring over a specified period.

Peak annual electrical demand for each Alternative was estimated using the projected total annual electricity consumption and typical load factors for each land use./25/ Estimated peak electrical demand for each Alternative for 2000 is shown in Table VI.H.3.

TABLE VI.H.3: PEAK ELECTRICAL DEMAND BY ALTERNATIVE, 2000 AND BUILD-OUT/2020/a/ (Megawatts)

	2000			2020		
	Alternative			Alternative		
	A	B	N	A	B	N
Peak Electrical Demand	18	9	11	46	16	24

/a/ Based on estimated annual electricity consumption and typical load factors for each land use. See Appendix H. Tables XIV.H.11-XIV.H.12, pp. XIV.H.11-XIV.H.12, for calculations and load factors.

SOURCE: Environmental Science Associates, Inc.

As compared to PG&E's total existing electrical generating capacity, the peak electrical demand associated with all of the Alternatives would be about 0.1% or less, thus adding incrementally to PG&E's total system load, but having no noticeable effect on PG&E's capacity. Mission Bay peak electrical demand would represent about 0.3% of PG&E's projected 5,500-MW growth in demand between 1985 and 2000 under Alternative A./21/ Alternatives B and N would represent about 0.2% of that growth in demand. PG&E does not anticipate any electrical generating capacity constraints that would interfere with serving year 2000 electrical loads at Mission Bay./26/

The Project Area would be served by the existing Potrero Substation. Preliminary load analysis by PG&E indicates that improvements to the electrical distribution system would be required to meet projected electrical demands./26/ Those improvements would be identical for all Alternatives for the year 2000. PG&E would install three additional 12-kilovolt (kV) feeders (major distribution lines) from the Potrero Substation to the Project Area to serve the additional load. An additional transformer bank at the Potrero Substation could also be required.

Natural Gas

PG&E does not anticipate any constraints in the availability of natural gas to serve the Alternatives./26/ The Project Area is currently served by a low-pressure gas distribution system, but is surrounded by a high-pressure system. This high-pressure system would be expanded and extended to meet the additional natural gas load for all Alternatives.

Build-Out/2020

Electricity

Table VI.H.3, p. VI.H.14, shows estimated peak electrical loads for each Alternative in 2020. As compared to PG&E's total existing electrical generating capacity, the peak electrical demand associated with Mission Bay Alternatives at build-out would be about 0.3% of current generating capacity or less. The Alternatives would add incrementally to PG&E's total system load. PG&E does not anticipate any electrical generating capacity constraints that would interfere with serving year-2020 electrical loads at Mission Bay./26/

The Project Area would be served by the existing Potrero Substation. Improvements to the existing distribution system would be required to meet electrical demands./26/ The types of improvements required would be similar for all Alternatives for the year 2020, but would differ in magnitude. PG&E would install additional 12-kV feeders from the Potrero Substation to the Project Area to serve the additional load. Eight additional feeders would be required for Alternative A, four would be required for Alternative B, and five would be required for Alternative N. An additional transformer bank at the Potrero Substation could also be required.

Natural Gas

PG&E does not anticipate any constraints in the availability of natural gas to serve the project in 2020./26/ The existing high-pressure gas distribution system that surrounds the Project Area would be expanded and extended to meet the additional natural gas load for all Alternatives.

TRANSPORTATION ENERGY

The amount of transportation energy consumed by each Alternative would vary in relation to total amount of travel and mode of transportation. Public transit would be more energy-efficient per passenger-mile than transportation by private automobiles. In Alternatives A and B, approximately 40% of the trips to and from the Project Area would be made on public transit and the remaining 60% would be made via private automobile. In Alternative N, about 20% of the Project Area-related trips would be made on public transit and about 80% would be made by private automobile. The proportion of trips made via public and private transit used in this analysis is considered "worst-case." Should the proportion of trips made via public transit increase due to increased traffic congestion or other factors, transportation energy-efficiency would increase, with a corresponding decrease in transportation energy consumption.

2000

Table VI.H.4 summarizes the projected annual transportation energy consumption for each Alternative for the year 2000.

Alternative A

Annual transportation energy consumption in 2000 under Alternative A would be about 1,300 billion at-source Btu, equivalent to about 220,000 barrels of crude oil./27/ That energy would consist of about 5.4 million gallons of gasoline, 2.3 million gallons of diesel, and 20 million kWh of electricity. Transportation energy consumption would be about triple the existing transportation energy consumption in the Project Area.

Total passenger-miles traveled under Alternative A would be about 430 million miles per year. Average transportation energy consumption would be about 3,100 Btu per

TABLE VI.H.4: ANNUAL TRANSPORTATION ENERGY CONSUMPTION BY ALTERNATIVE, 1985 AND 2000/a/

		2000		
	1985	Alternative		
Parameter		A	B	N
Annual Transportation Energy Consumption				
Gasoline (Gals., in thousands)	2,800	5,400	3,000	3,400
Diesel (Gals., in thousands)	100	2,300	1,200	910
Electricity (kWh, in thousands)	--	20,000	11,000	5,000
TOTAL (Btu, in billions)	420	1,300	710	670
Annul Passenger-Miles Traveled (in millions)	71	430	230	210
Transportation Energy Consumption (Btu/passenger-mile)	5,900	3,100	3,100	3,200

NOTE: Entries are rounded to two significant digits.

/a/ Based on estimates of project-related passenger and vehicle trips, modal splits, and geographic distribution of trips developed in the transportation analysis. See Appendix H. Tables XIV.H.13-XIV.H.15, pp. XIV.H.13-XIV.H.15, for transportation energy consumption factors and calculations.

SOURCE: Environmental Science Associates, Inc.

passenger-mile, a decrease of about 47% over existing conditions, due to projected increase in fuel-efficiency of automobiles and increase in mass transit use.

Alternative B

Transportation energy consumed under Alternative B would amount to about 710 billion Btu per year./27/ This would be equivalent to about 120,000 barrels of crude oil, an increase of about 70% over existing transportation energy consumption. This energy would be provided by about three million gallons of gasoline, 1.2 million gallons of diesel, and 11 million kWh of electricity.

About 230 million passenger-miles of travel per year would take place under Alternative B. Average transportation energy consumption would be about the same as Alternative A, a decrease of about 47% over existing conditions.

Alternative N

Annual transportation energy consumption in 2000 under Alternative N would be about 670 billion Btu, equivalent to about 120,000 barrels of crude oil./27/ This would be an increase of about 60% over existing transportation energy consumption. About 3.4 million gallons of gasoline, 910,000 gallons of diesel, and five million kWh of electricity would be consumed.

About 210 million passenger-miles of travel per year would take place under Alternative N, for an average transportation energy consumption of about 3,200 Btu per passenger mile, a decrease of about 46% over existing conditions. Transportation energy use under Alternative N would be slightly less efficient than under Alternatives A and B because of less use of mass transit in Alternative N.

Build-Out/2020

Table VI.H.5 summarizes the projected annual transportation energy consumption for Alternative for build-out/2020. Average transportation energy consumption for all Alternatives would be about 3,000 Btu per passenger-mile, a decrease of about 49% over existing conditions. Transportation energy efficiency would improve slightly between 2000 and 2020 due to the further increase in fuel-efficiency projected for automobiles.

Alternative A

Annual transportation energy consumption in 2020 under Alternative A would be about 2,700 billion Btu, equivalent to about 470,000 barrels of crude oil./27/ This energy would be provided by about 11 million gallons of gasoline, 4.8 million gallons of diesel, and 41 million kWh of electricity. Transportation energy consumption under Alternative A would be about six and one-half times existing transportation energy consumption in the Project Area. Alternative A would generate about 910 million passenger-miles of travel per year at build-out.

TABLE VI.H.5: ANNUAL TRANSPORTATION ENERGY CONSUMPTION BY ALTERNATIVE, BUILD-OUT/2020/a/

		2020 Alternative		
Parameter	1985	A	B	N
Annual Transportation Energy Consumption				
Gasoline (Gals., in thousands)	2,800	11,000	6,600	7,900
Diesel (Gals., in thousands)	100	4,800	2,600	2,200
Electricity (kWh, in thousands)	--	41,000	23,000	12,000
TOTAL (Btu, in billions)	420	2,700	1,600	1,600
Annual Passenger-Miles Traveled (in millions)	71	910	530	520
Transportation Energy Consumption (Btu/passenger-mile)	5,900	3,000	3,000	3,000

NOTE: Entries are rounded to two significant digits.

/a/ Based on estimates of project-related passenger and vehicle trips, modal splits, and geographic distribution of trips developed in the transportation analysis. See Appendix H. Tables XIV.H.16-XIV.H.18, pp. XIV.H.16-XIV.H.18, for transportation energy consumption factors and calculations.

SOURCE: Environmental Science Associates, Inc.

Alternative B

Transportation energy consumption in 2020 under Alternative B would be about 1,600 billion Btu per year./27/ That would be equal to about 280,000 barrels of crude oil, about four times existing consumption. This energy would consist of about 6.6 million gallons of gasoline, 2.6 million gallons of diesel, and 23 million kWh of electricity. Alternative B would generate about 530 million passenger-miles of travel per year at build-out.

Alternative N

Annual transportation energy consumption in 2020 under Alternative N would be about 1,600 billion Btu per year./27/ Transportation energy consumption under Alternative N would be equivalent to about 280,000 barrels of crude oil, about four times existing consumption. About 7.9 million gallons of gasoline, 2.2 million gallons of diesel, and 12 million kWh of electricity would be consumed. Alternative N would generate about 520 million passenger-miles of travel per year at build-out.

COMPLIANCE WITH ENERGY REGULATIONS AND OBJECTIVES

Buildings in Mission Bay would be required to comply with either the prescriptive or performance requirements of Title 24 Energy Conservation Standards. Compliance with Title 24 would be enforced by the San Francisco Department of Public Works, Bureau of Building Inspection, through the building permit review process. The sale and installation of appliances would be regulated by the Title 20 Appliance Efficiency Standards.

The Energy Component of the Environmental Protection Element of the City's Master Plan has established objectives to increase the efficiency with which energy is used locally in residences, commercial and industrial establishments, and transportation, and to promote the use of renewable energy sources. While there are no quantitative standards by which to judge compliance of Mission Bay with the Energy Component, the degree to which each Alternative implements energy conservation measures and exploits renewable energy sources would provide an informal measure of compliance. The higher the energy-efficiency of project layout and design, the better it will meet the City's energy objectives as outlined in the Energy Component of the Master Plan; however, it is not known at this time what types of energy conservation measures would be incorporated into the Alternatives (see Mitigation, p. VI.H.21).

MITIGATION

In addition to required compliance with energy-related regulations (Title 24 Energy Conservation Standards and Title 20 Appliance Efficiency Standards), Mission Bay energy consumption could be further reduced by other means. The following measures would increase energy efficiency, beyond that required by law, in conformance with the objectives and policies of the Energy Component of the Environmental Protection Element of the Master Plan.

Measure	Alternative	Description
H.1	A,B,N	Replace energy-intensive materials and construction methods with less-intensive ones, where feasible, to reduce construction energy consumption while maintaining the same final building performance criteria.
H.2	A,B,N	Consider energy consumption along with other factors in project design. Operational energy consumption could be reduced by a variety of measures. Possible energy-efficient measures are summarized below:/28/
H.2a		District Heating and Cooling System. A District Heating and Cooling (DHC) System could reduce the energy consumed in the generation of thermal energy (for space, water, or process heat) through the use of a more-efficient, centralized plant rather than individual heating units in each building. This measure is being investigated by PG&E and San Francisco Public Utilities Commission Bureau of Energy Conservation staff. A preliminary feasibility study by PG&E indicates that this option shows promise for high density development concentrated in localized portions of the Project Area, such as office and high density housing north of China Basin Channel in Alternative A. However, efficiencies of such a system would be affected by phasing of development and building design. As a result, further study would be warranted when additional details of the Mission Bay

Measure	Alternative	Description
		development become available. This is a "high-priority" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,29/
H.2b		Energy-Efficient Equipment and Appliances. Use of energy-efficient heating and cooling equipment and electric appliances could reduce operational energy consumption. This could be accomplished through the use of natural-gas-fired space and water-heating equipment, and energy-efficient electric appliances. This is a "high-priority" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,29/
H.2c		Reduced Lighting. Appropriate reductions in building lighting can conserve energy consumed by the lighting equipment itself, and additional air conditioning required to remove waste heat generated by the lights, while maintaining adequate light levels. Reduced-lighting strategies include targeting light levels to the task at hand (e.g., higher light levels in work areas and lower light levels in surrounding areas), use of more-efficient lighting equipment, automatic lighting controls (to turn off unneeded lights), and daylighting. A low-cost feasibility analysis for individual commercial buildings to determine energy and cost saving potential from utilizing daylighting could be required. This is a "high-priority" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,29/
H.2d		Operation and Maintenance Plans. Building system operation and maintenance plans could help to reduce operational energy consumption through more-efficient use and maintenance of building systems. Such plans could include information on all energy-consuming building systems, building-specific guidance on the most-efficient use of energy, and required maintenance. This measure would be most appropriate for non-residential buildings and large residential buildings. This is a "high-priority" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,29/

Measure	Alternative	Description
H.2e		Recycling and Conservation. Recycling of materials and conservation of water would have energy benefits in addition to decreasing the consumption of other natural resources. This is a "high-priority" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,29/
H.2f		Load Management. Load management strategies could be used to reduce the impact on electrical generating capacity. Energy loads could be reduced by "peak shaving" (the reduction of electrical demand during high utility use periods) and curtailable-load programs (in which participants receive financial incentives for shedding specified loads several times during the year). This is a "high-priority" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation. /28,29/
H.2g		Natural Cooling. Cooling loads could be reduced by taking advantage of San Francisco's year-round cool climate. Non-residential buildings could use outside-air economizers (which use cool outside air rather than energy-consuming refrigeration equipment for air conditioning) and, of course, residential buildings could use windows for natural ventilation. This is a "high-priority" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,29/
H.2h		Passive Solar Space-Heating. Passive solar space-heating uses design measures, rather than mechanical means, to collect and store solar energy. Passive solar design would be most appropriate for residential buildings, and could be considered in the overall context of design including construction costs, privacy, street orientation, and views. Solar energy could be collected directly in the living space and stored in the building materials. Passive solar design measures include building orientation (south-facing orientations are best), building use (locating the main living area on the south side of the building would maximize solar energy use), use of appropriate building

Measure	Alternative	Description
		materials to provide "thermal mass" to store thermal energy and moderate temperatures, optimizing glazing areas based on wall orientation, and use of suitable types and placement of landscaping. This is a "high-marketability" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,30/
H.2i		Energy Management and Control Systems. Computerized energy management and control systems can provide optimum control of energy-consuming equipment. These systems are most appropriate for relatively large (greater than 100,000 square feet) non-residential buildings. This is a "high-marketability" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,30/
H.2j		Individual Metering. Individual metering of electricity and natural gas use provides an incentive for tenants to use energy wisely. This would be an appropriate strategy for multi-family residential buildings. Individual metering (by tenant or by floor) could also be appropriate for multiple-tenant, non-residential buildings. This is a "high-marketability" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,30/
H.2k		Cogeneration. Cogeneration is the combined production of thermal energy and electricity. The thermal energy is typically used for on-site space, water, or process energy and the electricity is either used on-site or sold to a utility. Cogeneration is particularly well-suited to buildings with large thermal loads, and could be appropriate for large residential buildings (200 or more units), large non-residential buildings (greater than 300,000 square feet), light industries with process heat requirements, and the hotel. This is a "high-marketability" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,30/

Measure	Alternative	Description
H.2l		Landscaping and Building Orientation for Wind. Wind can increase the energy consumption of buildings through infiltration and cooling of the building surface. Buildings could be oriented with their long axes parallel to the prevailing winds (generally from the west and northwest in San Francisco), with landscaping on the west and northwest sides. These measures would reduce energy loss through wind while still providing adequate solar access, but could impose tradeoffs against other objectives such as siting and design of land uses, and land use efficiency. This is a "high-marketability" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,30/
H.2m		Optimized Glazing. Optimized glazing is the most energy-efficient combination of glass characteristics in a building. Factors which affect energy consumption include the amount (percentage) of glass, the daylight penetration, and the shading coefficient. Optimized glazing would be most appropriate for non-residential buildings. This is a "high-affordability" measure as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,31/
H.2n		Photovoltaics. While these semiconductor devices which produce electricity directly from sunlight are not currently economically feasible, their use could become cost-effective prior to project build-out. To accommodate possible future use of photovoltaics, solar access to building rooftops and flat or south-facing roofs should be considered in building design. Photovoltaics could have minor adverse visual impacts on views from surrounding areas. This is a measure that would prepare for future advances in technology, as defined by the San Francisco Public Utilities Commission, Bureau of Energy Conservation./28,32/
H.3	A,B,N	Reduce transportation energy consumption by measures which reduce the vehicle miles traveled and encourage the use of mass transit. Address these types of measures in a Transportation System Management (TSM) Plan.

NOTES

SETTING

/1/ Gerald Tyson, Marketing Supervisor, Pacific Gas and Electric Company (PG&E), telephone conversation, February 3, 1986.

/2/ John C. Brisky, PG&E, letter to ESA, October 16, 1986.

/3/ Edward Guerrero, Division Operator Supervisor-San Francisco, PG&E, telephone conversation, February 3, 1986.

/4/ John C. Brisky, PG&E, letter to ESA, August 27, 1986.

/5/ Pacific Gas and Electric Company, Annual Report, 1985.

/6/ Pumped-storage hydroelectric systems provide a means for the large-scale storage of energy. Excess electricity produced during periods of low electrical demand is used to pump water into an elevated reservoir. During periods of high electrical demand, the water is released to operate a hydroelectric generator.

/7/ California Energy Commission, The 1985 California Electricity Report, 1985.

/8/ Lawrence Kline, Deputy General Manager, Hetch Hetchy Water and Power Department, telephone conversation, June 29, 1987.

/9/ William Healy, Gas Plant Foreman, PG&E; telephone conversation, February 3, 1986.

/10/ San Francisco Department of City Planning, Energy Supply and Consumption Patterns: Trends and Prospects, 1975 - 1985, 1980.

/11/ A district steam heating system provides residential or commercial space heating for a neighborhood from a central plant.

/12/ One kilowatt-hour (kWh) is the basic unit of electric energy, equal to a demand of one kilowatt of power supplied steadily for one hour.

/13/ British thermal units (Btu) are units of heat energy. One Btu is the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at sea level. All forms of energy can be converted to heat energy. Btu values given in this report are "at-source" values, which means that energy used in producing and transporting the various types of energy is included as well as the actual energy content. For example, the at-source energy value of electricity includes losses in energy that occur during the generation and transmission of electricity, and the at-source energy value of gasoline includes energy consumed through extraction, refining, and transportation of the fuel. The at-source energy contents of various forms of energy used herein are as follows: electricity, one kWh = 10,239 Btu (California Energy Commission, Building Energy Efficiency Standards, 1987); natural gas, one cubic foot = 1,100 Btu (Interactive Resources, Inc., Energy Conservation: Guidelines for Evaluating New Development in Contra Costa County, California, 1976); gasoline, one gallon = 143,700 Btu (Caltrans, Energy and Transportation Systems, 1983); and diesel fuel, one gallon = 147,600 Btu (Caltrans, Energy and Transportation Systems, 1983).

/14/ This estimate is based on information on existing land uses (floor areas by use and total employees) contained in Chapter V. The EIR Alternatives and Approval Process. See Appendix H for annual energy consumption factors and calculations.

/15/ San Francisco Department of City Planning, EE81.3, Downtown Plan EIR, certified October 18, 1984.

/16/ Reserve Margin is the difference between the net system generating capacity at a given time, including down-time for maintenance, and the system's maximum load (demand) requirements, including net scheduled transfer with other utilities, expressed as a percentage of the maximum demand.

/17/ Estimates of existing transportation energy consumption were based on estimates of the number and geographic distribution of passenger- and vehicle-trips developed for the Transportation analysis. Consumption factors for automobiles are from Caltrans, Energy and Transportation Systems, 1983. Existing use of mass transit in the Project Area is negligible.

IMPACT

/18/ Hannon, B., et al., 1978, "Energy and Labor in the Construction Sector," Science 202:837-847.

/19/ Based on construction energy consumption factors contained in Hannon, B., et al., floor area projections contained in V. The EIR Alternatives, and Infrastructure Construction Energy Data from Interactive Resources, Inc., Energy Conservation: Guidelines for Evaluating New Development in Contra Costa County, California, 1976. See Appendix H. Energy, Tables XIV.H.2-XIV.H.4, pp. XIV.H.2-XIV.H.4, for calculations and consumption factors.

/20/ San Francisco Department of City Planning, Downtown Plan EIR, 1984.

/21/ Pacific Gas and Electric Company, Forecast of the Demand for Electricity within the Pacific Gas and Electric Company Service Area 1987-2007, June 1987.

/22/ California Gas and Electric Utilities, 1987 California Gas Report, September 1987.

/23/ Based on commercial energy consumption factors from the California Energy Commission (Hoang Dang Nguyen, Research Economist, April 24, 1987), residential energy consumption factors from San Francisco Department of City Planning, Energy Conservation Potential for Natural Gas and Electricity: 1980-1990, 1981, and floor area projections contained in V. The EIR Alternatives and Approval Process. See Appendix H. Energy, Tables XIV.H.5-XIV.H.10, pp. XIV.5-XIV.H.10 for calculations and consumption factors.

/24/ PG&E has forecast electrical consumption and demand in its service area for 2007. (Pacific Gas and Electric Company, Forecast of the Demand for Electricity within the Pacific Gas and Electric Company Service Area 1987-2007, June 1987.) PG&E projects an increase of 53 billion kWh per year in consumption, and about 10,000 MW in demand, from 1985 to 2007. Project-related electricity consumption in 2020 would represent about 0.3% of the 1985-2007 increase in consumption in PG&E's service area under Alternative A, about 0.1% under Alternative B, and about 0.2% under Alternative N. Project-related electrical demand would represent about 0.5%

of PG&E's 1985-2007 growth in demand under Alternative A, and about 0.2% under Alternatives B and N. PG&E has forecast natural gas consumption in its service area for 2005. (California Gas and Electric Utilities, 1987 California Gas Report, September 1987.) PG&E projects an increase in natural gas consumption of about 248 billion cubic feet per year from 1985 to 2005. Natural gas consumption under Alternatives A and B in 2020 would represent about 0.2% of PG&E's 1985-2005 growth in natural gas consumption; natural gas consumption under Alternative N in 2020 would represent less than 0.1% of PG&E's 1985-2005 growth in natural gas consumption.

/25/ A load factor is the ratio of average electrical demand to peak electrical demand over a specified period.

/26/ Dirk van Ulden, Marketing Manager, PG&E, letter, September 22, 1987. Based on estimates of energy consumption and demand provided by Environmental Science Associates, Inc.

/27/ Based on estimates of project-related passenger- and vehicle-trips, modal splits, and geographic distribution of trips developed in the transportation analysis. See Appendix H, Energy, Tables XIV.H.13-XIV.H.18, pp. XIV.H.13-XIV.H.18, for transportation energy consumption factors and calculations.

/28/ San Francisco Public Utilities Commission, Bureau of Energy Conservation, An Energy Plan for Mission Bay, Proposed Energy Efficiency Recommendations at the Mission Bay Project, Draft, 1987. The mitigation measures listed in H.2, p. VI.H.21, are summarized from the proposed Energy Plan.

/29/ High-priority measures include those that would provide the greatest benefit to Mission Bay residents and businesses in terms of energy and monetary savings. They also have the broadest base of support within the technical community and embody the characteristics of both marketability and affordability.

/30/ High-marketability measures are those that would contribute to the attractiveness (marketability) of Mission Bay while also reducing energy consumption and costs. Energy-conscious design principles could add to the amenity of the living environment by providing good light, fresh air, and comfortable living conditions.

/31/ High-affordability measures are those where the primary benefits are reduced energy costs. These measures may sometimes reduce initial cost as well.

/32/ Measures that prepare for future advances in technology include solar technologies such as photovoltaics that at present are not cost-effective sources of energy production, but will likely become increasingly available during the construction period of Mission Bay. These measures present design methods that will allow the implementation of alternative technologies in the future.

I. ARCHITECTURAL RESOURCES AND URBAN DESIGN

SETTING

ARCHITECTURAL RESOURCES

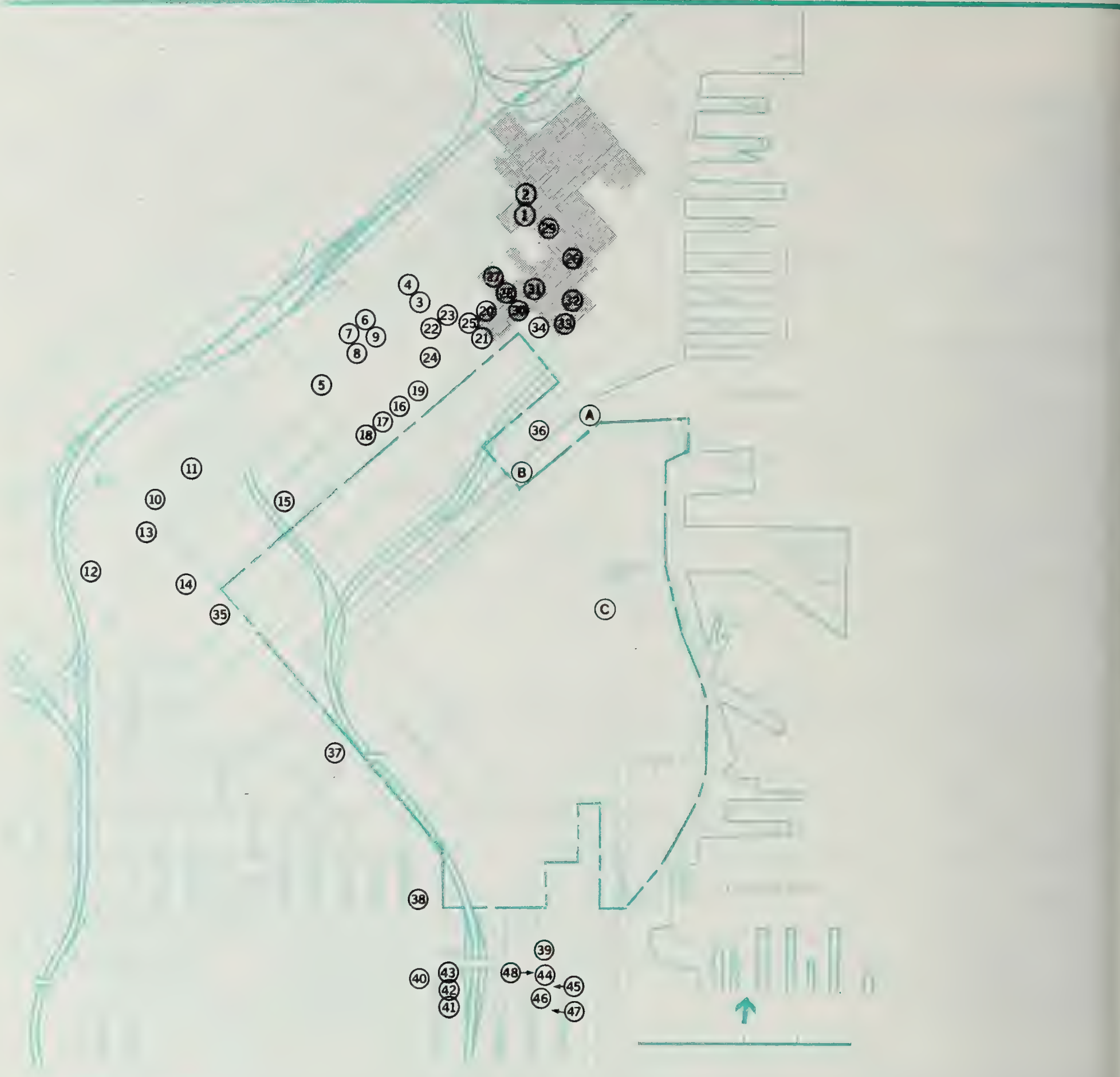
Architectural Surveys in San Francisco

The San Francisco Department of City Planning conducted a citywide inventory of architecturally significant buildings from 1974 to 1976, with numerical ratings from a low of "0" to a high of "5"./1/ The DCP survey listed no buildings within the Mission Bay Project Area. Within 1,000 feet of the project boundaries, 33 buildings are rated (see Figure VI.I.1, and Table VI.I.1, p. VI.I.3)./2/ Of these, the survey rated 28 buildings "0," "1" or "2," four rated "3," one was rated "4," and none "5."

The Foundation for San Francisco's Architectural Heritage (Heritage) has undertaken architectural surveys of South of Market areas, including Rincon Hill, Rincon Point, South Beach, Showplace Square, Mission Bay and the piers north of China Basin Channel. Within 1,000 feet of the project boundary, Heritage identified 22 structures as architecturally significant (see Figure VI.I.1 and Table VI.I.1)./3/ Other nearby areas had not been surveyed, such as the Port of San Francisco area near China Basin Street, and areas south of Mariposa Street. The northern portion of Potrero Hill, south of the Mission Bay Project Area, has been surveyed; the findings have not been published when this EIR was prepared.

Heritage has proposed that the Second and Townsend Streets area (outside the Mission Bay Project Area) be designated a historic district but has not defined a specific boundary for such a district, and is also considering proposing the four blocks that surround Bluxome Street, bounded by Fourth, Townsend, Sixth, and Brannan, adjacent to the Project Area, for historic district status (see Figure VI.I.1).

A 1983 historic architecture report for the I-280 Transfer Concept Study prepared by Caltrans identified two structures and proposed a South End Historic District near the Project Area at Second and Townsend as eligible or potentially eligible for listing on the National Register of Historic Places/4/ (see Figure VI.I.1 and Table VI.I.1). No further action listing those resources has been taken./5/



①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫
⑬
⑭
⑮
⑯
⑰
⑱
⑲
⑳
㉑
㉒
㉓
㉔
㉕
㉖
㉗
㉘
㉙
㉚
㉛
㉜
㉝
㉞
㉟
㊱
㊲
㊳
㊴
㊵
㊶
㊷
㊸
㊹
㊺
㊻
㊼
㊽
Ⓐ
Ⓑ
Ⓒ

———	MISSION BAY BOUNDARY
Ⓐ	LEFTY O'DOUL BRIDGE
Ⓑ	PETER MALONEY BRIDGE
Ⓒ	CLOSED FIRE STATION 30
① – ㊽	See Table VI.I.1 for building key.
▨	PROPOSED SOUTH END HISTORIC DISTRICT

SOURCE: Environmental Science Associates, Inc.

FIGURE VI.I
ARCHITECTURAL RESOURCE
WITHIN PROJECT AREA AND VICINIT

TABLE VI.I.1: ARCHITECTURAL RESOURCES IN PROJECT VICINITY/a/

	Address	DCP Rating	On Heritage List
1.	300-310 Brannan	NR	Yes
2.	1 South Park	NR	Yes
3.	444 Brannan	1	No
4.	72 Freelon	2	No
5.	590 Brannan	1	No
6.	132-134 Freelon	0	No
7.	142-152 Freelon	0	No
8.	119 Freelon	0	No
9.	105 Freelon	1	No
10.	567 Seventh	3	No
11.	55-57 Boardman	1	No
12.	555-599 Eighth	2	Yes
13.	572 Seventh	2	No
14.	650 Seventh	NR	Yes
15.	665 Sixth	NR	Yes
16.	310 Townsend	2	Yes
17.	334 Townsend	3	No
18.	340-360 Townsend	3	Yes
19.	690 Fourth	0	No
20.	660-674 Third	1	Yes
21.	224 Townsend	1	No
22.	475-477 Brannan	1	Yes
23.	435 Brannan	2	No
24.	601-631 Fourth	NR	Yes
25.	322-326 Ritch	NR	Yes
26.	698 Second	NR	Yes
27.	625 Third	NR	Yes
28.	665 Third	NR	Yes
29.	301 Brannan	NR	Yes
30.	180 Townsend	NR	Yes
31.	178 Townsend	NR	Yes
32.	115-131 Townsend/b/	NR	Yes
33.	128 King/b/	NR	Yes
34.	135 Townsend	NR	Yes
35.	700-768 Seventh	3	Yes
36.	China Basin Building	1	Yes
37.	1200 Seventh	2	No
38.	199 Mississippi	1	No
39.	694 Tennessee	1	No
40.	300 Pennsylvania	4	No
41.	367 Pennsylvania	0	No
42.	331 Pennsylvania	2	No
43.	301 Pennsylvania	2	No
44.	700 Tennessee	1	No
45.	704 Tennessee	1	No

(continued)

TABLE VI.I.1: ARCHITECTURAL RESOURCES IN PROJECT VICINITY/a/ (continued)

	Address	DCP Rating	On Heritage List
46.	724-726 Tennessee	1	No
47.	732 Tennessee	1	No
48.	707 Eighteenth	0	No
A.	Lefty O'Doul Bridge	NR	No
B.	Peter Maloney Bridge	NR	No
C.	Closed Fire Station 30	NR	No

DCP - Department of City Planning.
Heritage - Foundation for San Francisco's Architecutral Heritage.
NR - Not rated.

/a/ Numbered and lettered buildings and bridges are shown on Figure VI.I.1, p. VI.I.2.
/b/ Identified in I-280 Transfer Concept Study as potentially eligible for the National Register of Historic Places.

SOURCE:
Department of City Planning; Foundation for San Francisco's Architectural Heritage; Royer Owen Boyer & Associates; and Environmental Science Associates, Inc.

Architectural Resources in the Mission Bay Project Area

Few existing buildings within the Mission Bay Project Area have been noted by historic or architectural surveys as important architectural resources. Closed Fire Station 30, at Third, Fourth and Mission Rock Streets in the Project Area (see Figure VI.I.1, p. VI.I.2) is not rated in the DCP or Heritage surveys. Constructed of red brick masonry in the Mission style, the two-story building has a Spanish tile roof surmounted by a low tower. The brick and masonry materials are sensitively designed and detailed. The building has a rear yard with an intricately detailed metal entrance gate flanked by two brick piers.

Historic and Architectural Resources in the Vicinity

The two China Basin Channel bridges, the Lefty O'Doul drawbridge at Third Street and the Peter J. Maloney drawbridge at Fourth Street are unique engineering structures. Both bridges have steel truss work and counterbalance structures. Evaluations of the historic significance of the bridges have concluded that both are eligible for listing on the National Register of Historic Places (see VI.J. Cultural Resources, p. VI.J.12).

Between the two bridges, adjacent to the Project Area, is the China Basin Building, listed in the DCP and Heritage Surveys. Constructed in 1921, the six-story former warehouse fronts the channel from Third to Fourth Street. Many of the buildings listed by Heritage, adjacent to the Mission Bay Project Area along Townsend or Seventh Streets, are former brick industrial or warehouse structures that have been converted to office or showroom uses. These buildings typically include brick work with decorative cornice and window details with masonry accents (see listings nos. 15-19, on Figure VI.I.1 and Table VI.I.1). The Baker Hamilton Design Center, formerly the Baker Hamilton Company's hardware and steel product warehouse at 700-768 Seventh Street, built in 1904 by Albert Pissis (listing no. 35), is a notable example of such brick and masonry design in the Showplace Square area./3/ The Baker Hamilton sign on the building's roof is visible from U.S. 101 to the west.

VISUAL QUALITY

Views from Potrero Hill

The Mission Bay Project Area, reflecting its history as filled land, is a relatively level area where visual landmarks are primarily low-rise buildings and other man-made structures. They contrast with surrounding high elements, such as Potrero Hill to the south, high-rise buildings in the financial district to the north, and I-280 wrapping around the west and north sides of the Project Area.

Figure VI.I.2, pp. VI.I.8-VI.I.9, is a panoramic view of the Mission Bay site from Potrero Hill southwest of the site. The prominent site characteristics include railroad tracks and the CalTrain station; one-story warehouses and light-industrial buildings; and elevated freeway structures. China Basin Channel, which extends across the site from Seventh Street to China Basin, divides the Project Area. Figure VI.I.2 also includes a reference key to the skyline view and an outline of the Project Area boundaries./6/

The elevated I-280 freeway visually defines the southwesterly boundary of the site. The freeway varies in height from 45 to 75 feet above ground and in some areas is up to 200 feet wide. At China Basin Channel near Seventh Street, the freeway turns northeast across the Project Area and parallels the north side of the channel with an exit ramp at Fourth Street. The remaining, unused "stub" of the elevated freeway continues to, and ends at, Third Street.

China Basin Channel, the last open water area of what was once Mission Bay, is a visual landmark for the northerly part of the site. Beginning near Seventh Street, at the Channel Street Pump Station, the channel flows under the Sixth Street I-280 ramp, and the Fourth and Third Street drawbridges, to China Basin and San Francisco Bay. The channel varies in width from 180 to 280 feet over its 4000-foot length.

North and northeast, adjacent to the site, are one- to five-story industrial and office buildings along Townsend Street (the northwesterly boundary of the Project Area) and along Third Street between Townsend and China Basin Channel. Beyond these buildings, the heights of buildings gradually step up to the high-rise buildings of the financial district, which range up to 52 stories. Figure VI.I.2 shows high-rise buildings in the First Street-Market-Mission area. North of the site are other landmarks: the Union 76 sign at Fremont and Harrison Streets, the clock tower at 461 Second Street near Bryant, and the brick chimney at 178 Townsend Street near Third. To the west of the Project Area is a former warehouse area, now the Showplace Square wholesale center, partially visible in Figure VI.I.2.

Views from Other Areas

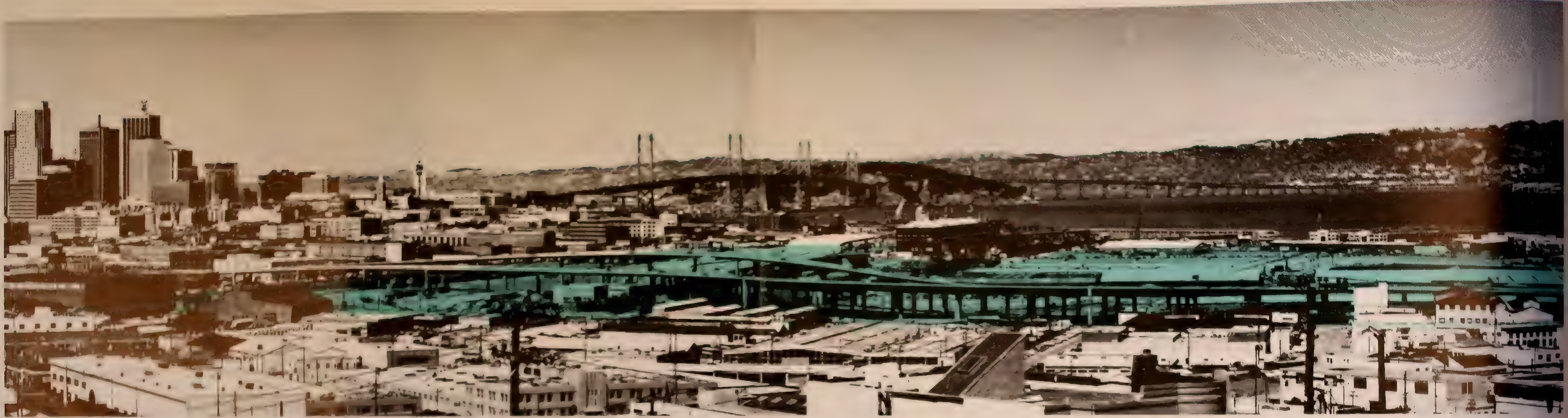
Views toward the Mission Bay Project Area from the north and northwest are limited because of existing taller buildings. From high-rises in the San Francisco financial district, the site is seen in the midground, adjacent to San Francisco Bay with the Oakland hills in the distance. The site characteristics are similar to those described for the Potrero Hill view, above.

Views of the site from the east, such as from China Basin Street, are limited because of the low elevation of viewpoints near San Francisco Bay; beyond the site, to the south and west, Potrero Hill and Twin Peaks are the major features.

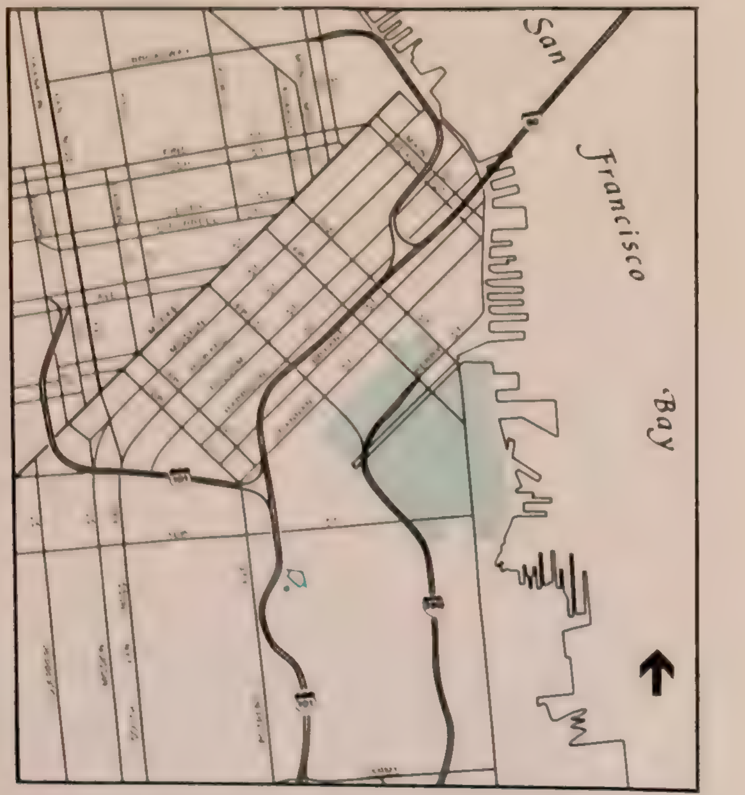
URBAN DESIGN

Urban Design Features

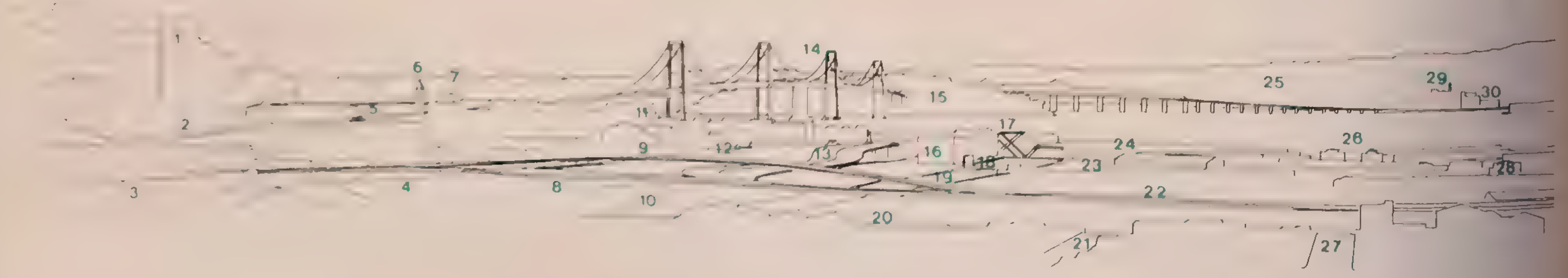
The needs of railroading, shipping and warehousing industries that developed in 19th century and early 20th century San Francisco were the major determinants of street patterns, waterways and building forms in the Mission Bay area. Existing street and block

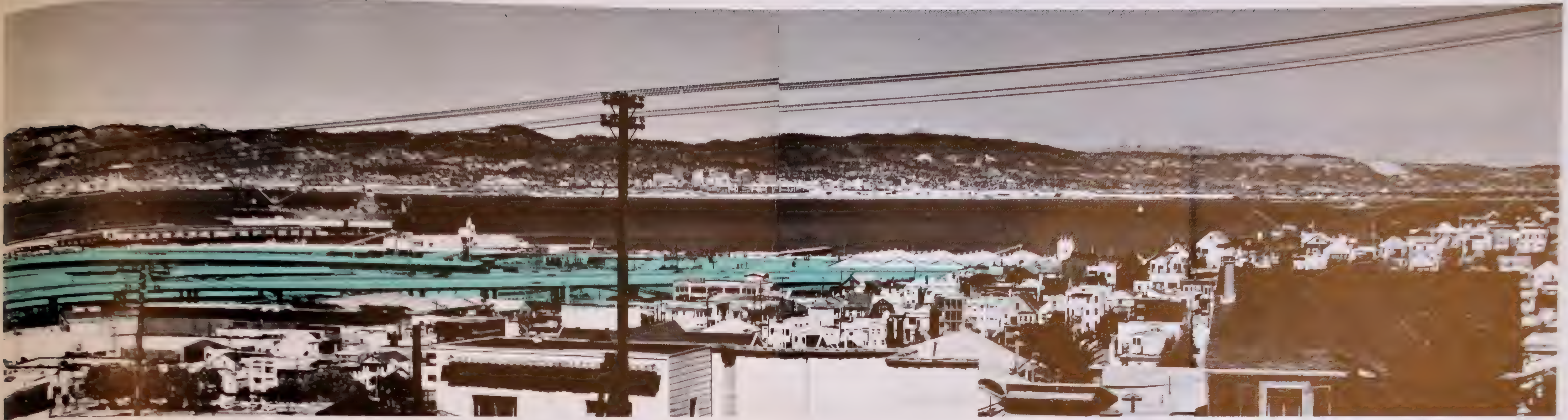


The photograph was taken from the roof of Patrick Henry School, 639 Vermont Street near 18th Street, to provide an unobstructed view of the Project Area. Although the viewpoint is not publicly accessible, it is similar to views partially available from streets and residences on Potrero Hill.



1. DOWNTOWN SAN FRANCISCO HIGHRISES
2. FIFTH STREET ON RAMP TO I-80
3. BAKER HAMILTON DESIGN CENTER
4. TOWNSEND STREET
5. EMBARCADERO FREEWAY
6 CLOCK TOWER - 461 SECOND STREET NEAR BRYANT STREET
7. UNION 76 SIGN
8 SIXTH STREET ON-RAMP TO I-280
9 SIXTH STREET OFF-RAMP FROM I-280
10. CHANNEL STREET PUMPING STATION
11. SMOKESTACK - 178 TOWNSEND NEAR THIRD STREET
12. CALTRAIN COMMUTE TERMINAL
13. UNUSED I-280 STUB
14. SAN FRANCISCO - OAKLAND BAY BRIDGE
15. YERBA BUENA ISLAND
16. CHINA BASIN BUILDING
17. LEFTY O'DOUL BRIDGE AT THIRD STREET
18. PETER J. MALONEY BRIDGE AT FOURTH STREET
19. CHINA BASIN CHANNEL
20. SEVENTH STREET
21. IRWIN STREET
22. I-280
23. FOURTH STREET AND BANANA TRIANGLE
24. PIER 46A
25. OAKLAND HILLS
26. PIER 48
27. HUBBELL STREET
28. CLOSED FIRE STATION 30
29. U.C. BERKELEY
30. EMERYVILLE

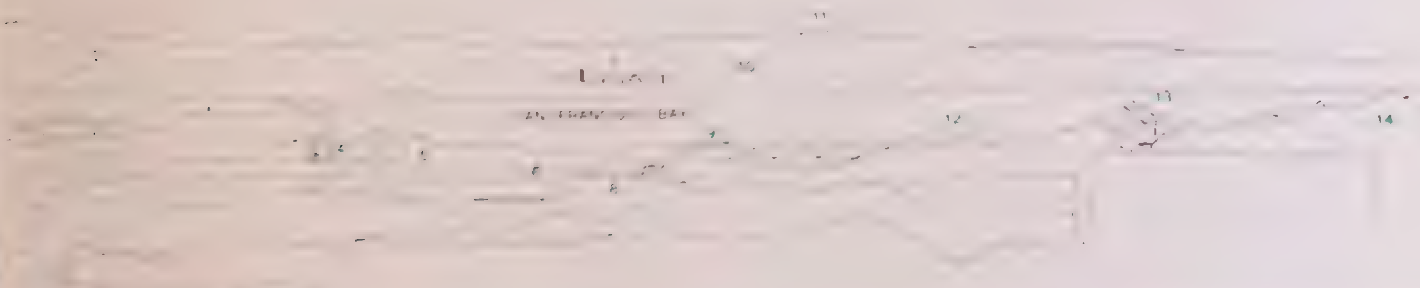




1	SEVENTH STREET
2	PIER 50
3	CLAREMONT HOTEL
4	KAISER SAND AND GRAVEL
5	PIER 54
6	I-280
7	DOWNTOWN OAKLAND
8	135 MISSISSIPPI STREET NEAR MARIPOSA STREET
9	PIER 64
10	OAKLAND HILLS
11.	MT. DIABLO
12	SAND AND GRAVEL CONVEYOR
13	PORT CRANES AT 19TH STREET NEAR ILLINOIS STREET
14.	POTRERO HILL

🟩 PROJECT AREA

— PROJECT AREA BOUNDARY



Mission Bay

FIGURE VII.I.2
VIEW OF MISSION BAY
PROJECT AREA
FROM POTRERO HILL

SOURCE: Roger Owen Boyer and Associates

patterns were only partially extended into this area; Mission Bay streets were developed based on large blocks permitting development of warehouse and industrial buildings. Few streets are provided with curbs, gutters and sidewalks. The elevated I-280 Freeway, the Sixth Street and the Third Street stub off-ramp were constructed across the site in the 1970s, and many railroad tracks have been removed recently, reflecting the increased use of highway transportation.

Pedestrian-oriented areas in Mission Bay are limited primarily to unimproved open space near China Basin Channel and the Bay; there is no housing except for a houseboat community on the south side of the channel, and no major trees or landscape features (see VI.D. Community Services and Infrastructure, Recreation and Parks, p. VI.D.11-.14, for a discussion of Mission Bay open space resources). Due to the Project Area's South of Market location and its low building scale, sunshine and distant views are abundant.

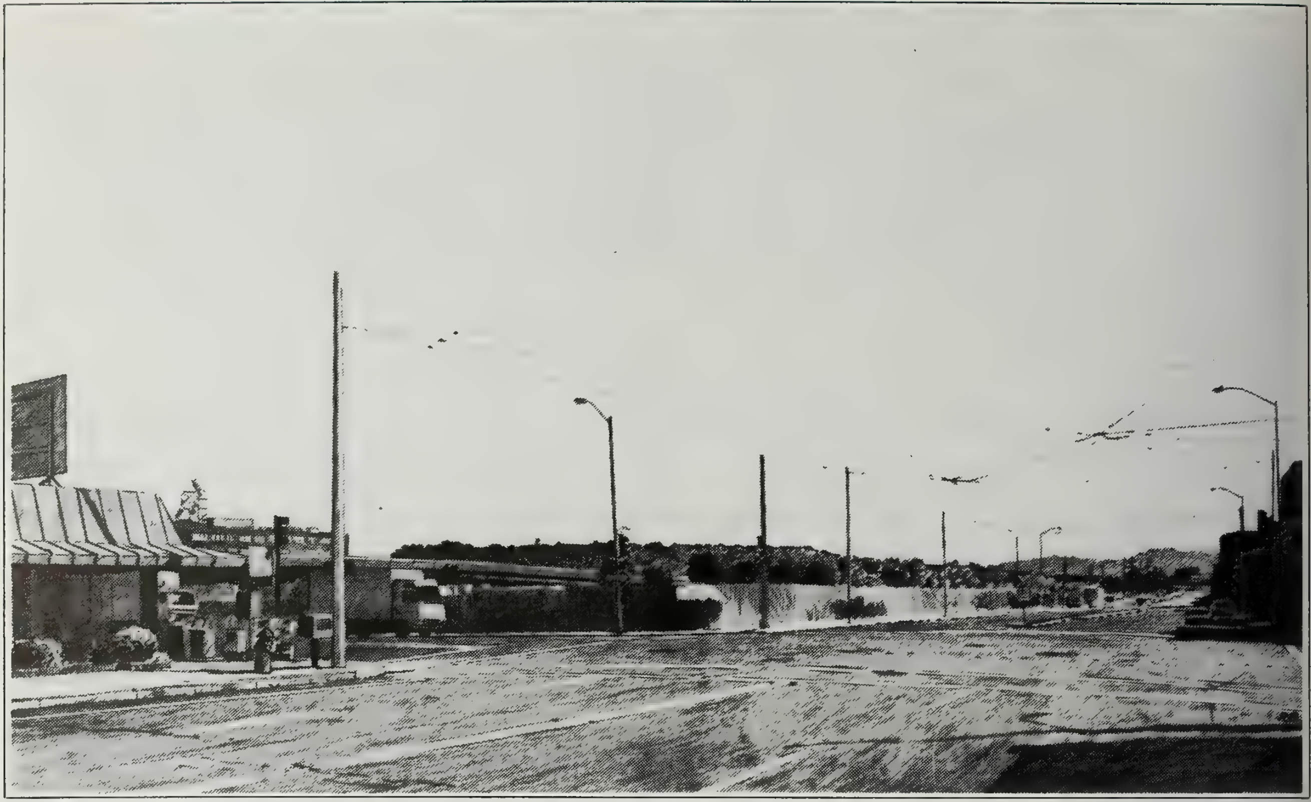
Most buildings on the site are large, one-story structures built of utilitarian materials. The buildings usually have no special architectural form, windows or decorative elements that provide pedestrian interest. However, even with the industrial nature of the site, a variety of urban design conditions do exist. Six selected locations illustrate typical streetscapes in the Mission Bay Project Area and represent conditions that apply to other areas of the site.

Third and Townsend Streets

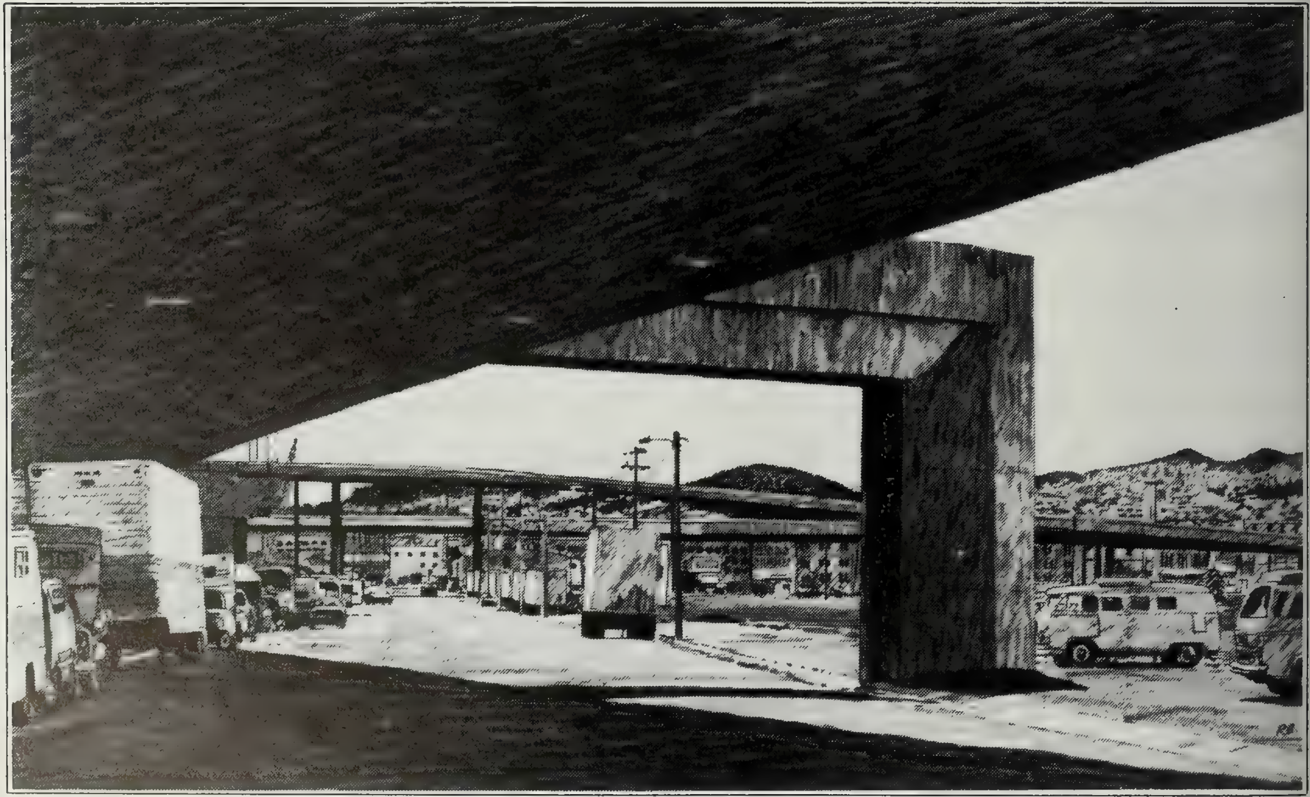
The intersection of Third and Townsend Streets is at the northern boundary of the Project Area, the area closest to downtown San Francisco. It is the former Southern Pacific railroad station site (see Viewpoint 1, Figure VI.I.3) currently the San Francisco Recreational Vehicle (RV) Park. Narrow sidewalks flank both streets and the RV park is screened by six-foot high, vine-covered, chain-link and wooden fences.

Third Street is one-way northbound, with much of the traffic originating from the I-280 Fourth Street off-ramp. Townsend Street is a two-way street. Before the filling of Mission Bay, this area was known as Steamboat Point.

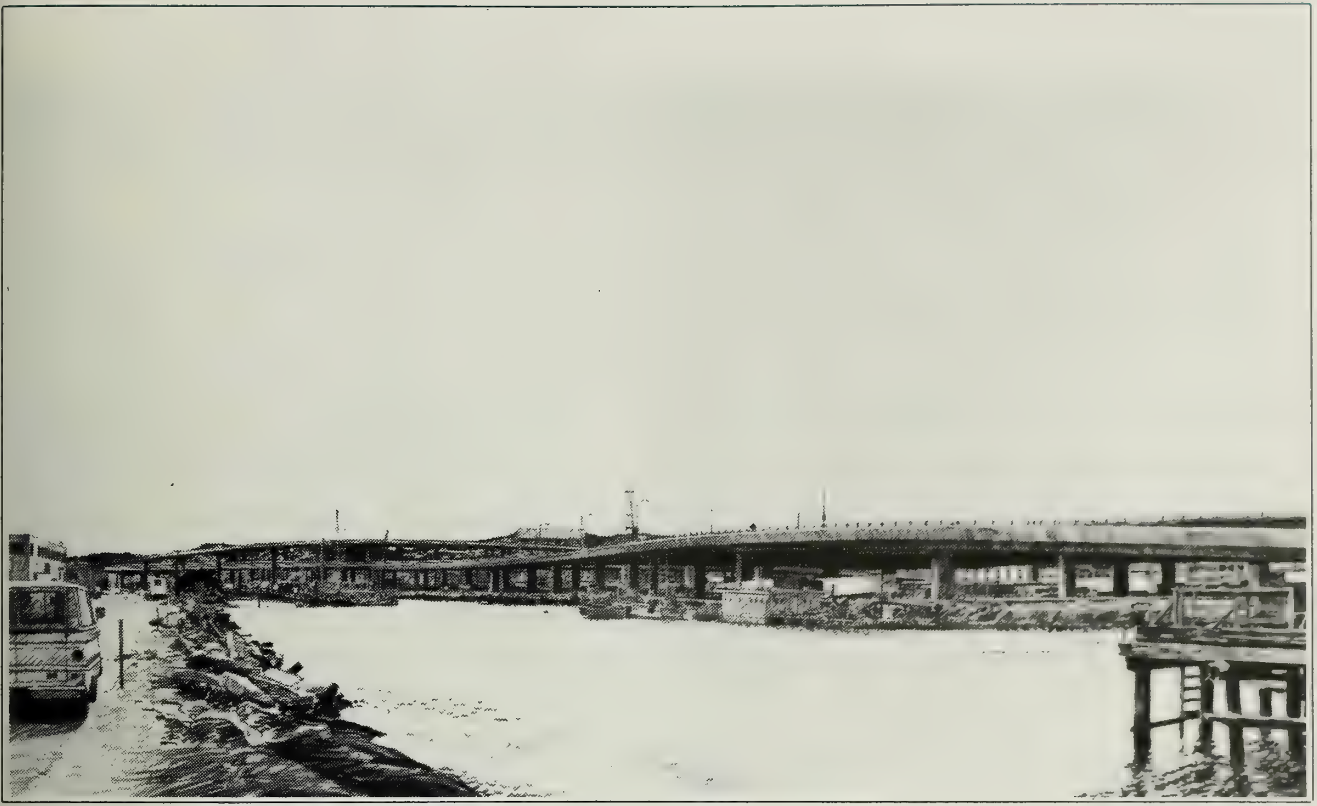
The adjacent buildings include fast-food restaurants, storefronts displaying wholesale industrial products and parking lots. In the distance as one looks down Townsend Street, Potrero Hill is seen south of the Project Area, with Diamond Heights to the right. Older



VIEWPOINT 1: Third and Townsend Streets



VIEWPOINT 2: Berry Street near Fourth Street



VIEWPOINT 3: China Basin Channel near Fourth Street

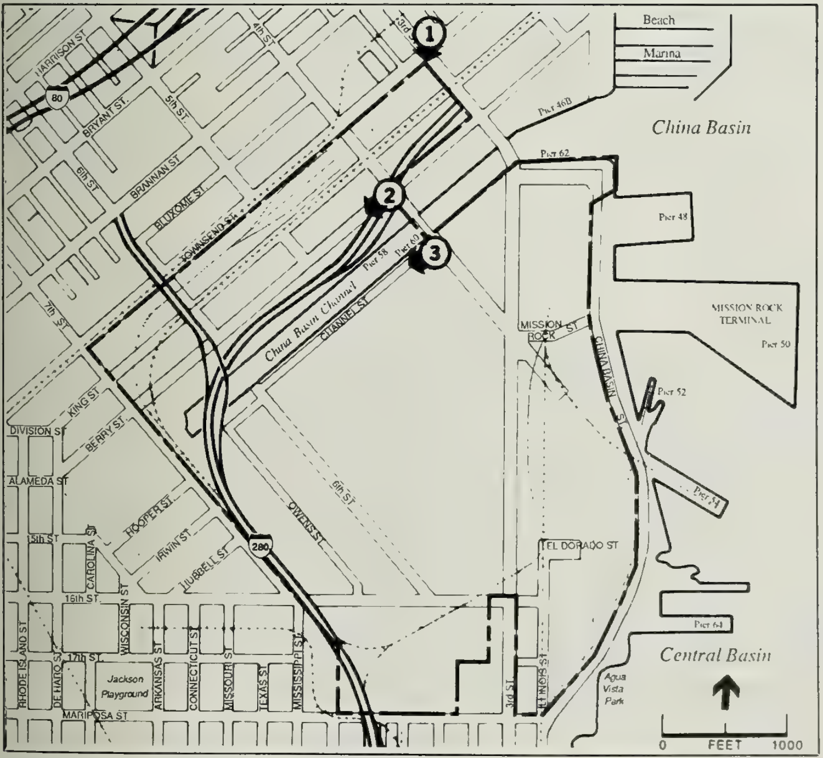

HARRISON ST
80
BRYANT ST.
5th ST.
4th ST.
3rd
1
Beach
Marina
Pier 46B
China Basin
Pier 62
6th ST
BRANNAN ST
BLUXOME ST.
TOWNSEND ST.
2
Pier 48
Pier 58
Pier 60
3
7th ST
China Basin Channel
CHANNEL ST
MISSION ROCK ST
CHINA BASIN ST
MISSION ROCK TERMINAL
Pier 50
Pier 52
KING ST
DIVISION ST
BERRY ST
ALAMEDA ST
6th ST
Pier 54
HOOPER ST
IRWIN ST
15th ST
CAROLINA ST
HUBBELL ST
280
OWENS ST
EL DORADO ST
16th ST.
WISCONSIN ST
Pier 64
17th ST.
RHODE ISLAND ST
DE HARO ST
Jackson Playground
ARKANSAS ST
CONNECTICUT ST
MISSOURI ST
TEXAS ST
MISSISSIPPI ST
3rd ST
ILLINOIS ST
Agua Vista Park
Central Basin
MARIPOSA ST
0
FEET
1000

FIGURE VI.I.3
EXISTING VIEWS -
1. THIRD AND TOWNSEND STREETS
2. BERRY STREET NEAR FOURTH STREET
3. CHINA BASIN CHANNEL NEAR FOURTH STREET

OURCE: Roger Owen Boyer and Associates

six- to eight-story masonry buildings are seen easterly on Townsend Street (and north on Third, not visible in Figure VI.I.3, p. VI.I.12). As noted on p. VI.I.6, those buildings include many listed by Heritage for architectural quality and typically decorative brick work, cornice and window details.

Berry Street Near Fourth Street

The view southwest down Berry Street near Fourth Street is under the I-280 Freeway north of China Basin Channel (see Viewpoint 2, Figure VI.I.3, p. VI.I.12). The elevated freeway at this point is a concrete structure, supported by widely spaced concrete columns, about 138 feet wide and 30 feet high. The ground area is a parking lot for campers, semi-trailers and cars, some apparently abandoned. Further south is the Fourth Street off-ramp (not shown in Figure VI.I.3).

Berry Street in this area is partially paved, with no sidewalks. Adjacent to each side of the street are open areas, formerly railroad switching yards. Two blocks westerly, the elevated I-280 Sixth Street ramps are visible crossing Berry Street. All of the buildings visible under the off-ramp are west of Seventh Street, outside the Project Area, primarily warehouse and industrial buildings, ranging from one to three stories. Many of the buildings have been converted to furniture showrooms and offices related to the Showplace Square area. Potrero Hill is visible to the south and Twin Peaks to the west.

China Basin Channel Near Fourth Street

China Basin Channel at Channel Street near Fourth Street is the widest (270 feet) portion of the waterway (see Viewpoint 3, Figure VI.I.3, p. VI.I.13). The shoreline in the foreground is concrete rubble placed there to reduce erosion. On the northerly side of the channel is an earthen embankment with docked boats. To the south, Channel Street accommodates parked vehicles during weekdays; the paved street has no curbs or sidewalks. Warehouse and trucking operations are located in the Project Area south of the view. In the easterly (right-hand) portion of the view is part of the outdoor dining deck of Carmen's Restaurant fronting on Fourth Street.

At the westerly end of the channel, the Mission Creek houseboat community is visible, with gangways from Channel Street to a floating pier. This floating pier (not visible in the view) is one of the few pedestrian ways in the Mission Bay Project Area. The embankment adjacent to the houseboat pier, informally improved with some plantings and picnic tables, provides a pathway for pedestrians with views of the houseboats.

The elevated I-280 freeway is north of the waterway. The freeway structure seen above the houseboats is the Sixth Street off-ramp, about 80 feet above the water. The freeway visible in the easterly portion of the view is the I-280 stub and the Fourth Street off-ramp. Berry Street is beneath portions of the freeway and buildings along Townsend Street, north of the Project Area, are visible beneath the freeway. At the westerly end of China Basin Channel, Potrero Hill is visible, partially obscured by the freeway, with the Mt. Sutro tower visible in the background.

Third, Fourth and Mission Rock Streets

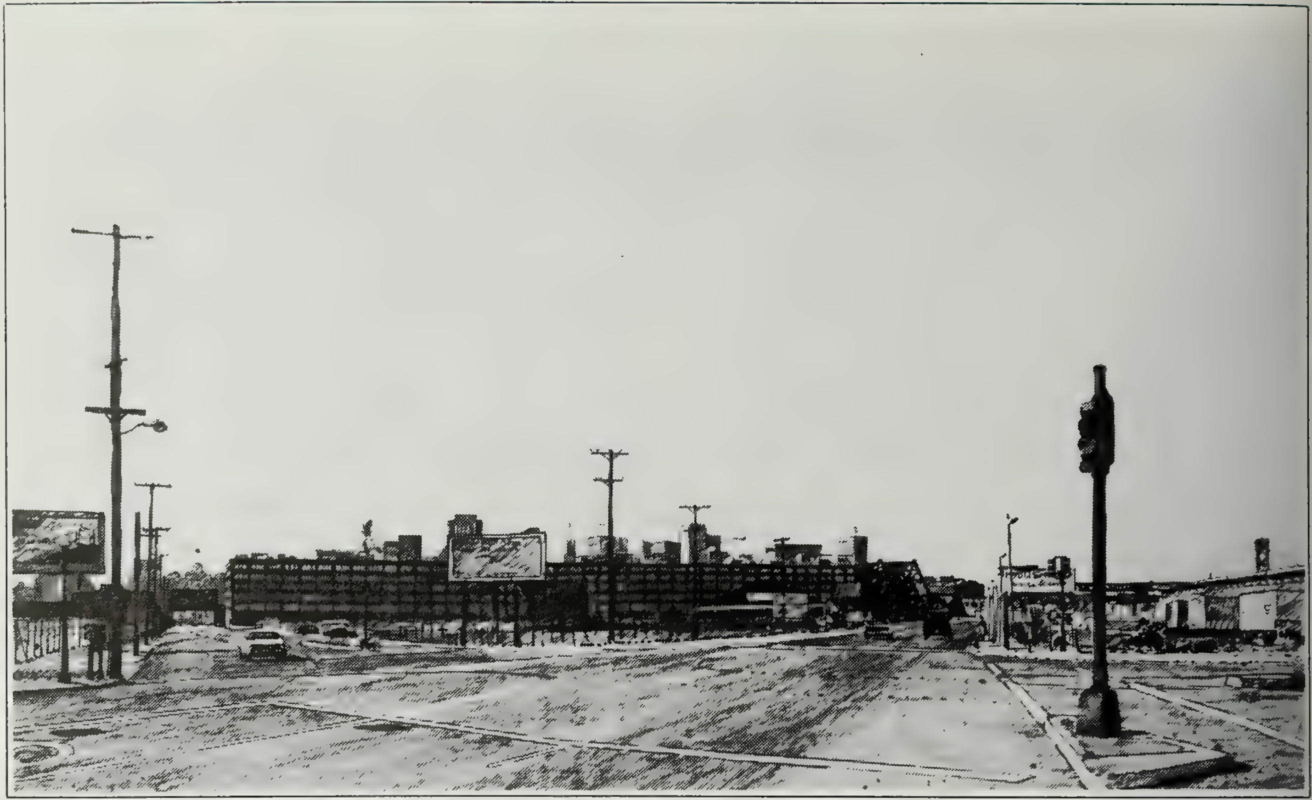
Third and Fourth Streets intersect at a 45° angle, permitting a northerly view to the north up both streets, including the drawbridges in the distance (see Viewpoint 4, Figure VI.I.4). Between Third and Fourth Street is the "Banana Triangle" (formerly an area used for unloading and warehousing bananas shipped to San Francisco). The China Basin Building, the downtown San Francisco skyline and the Bay Bridge are visible to the north.

Former Southern Pacific Railyards

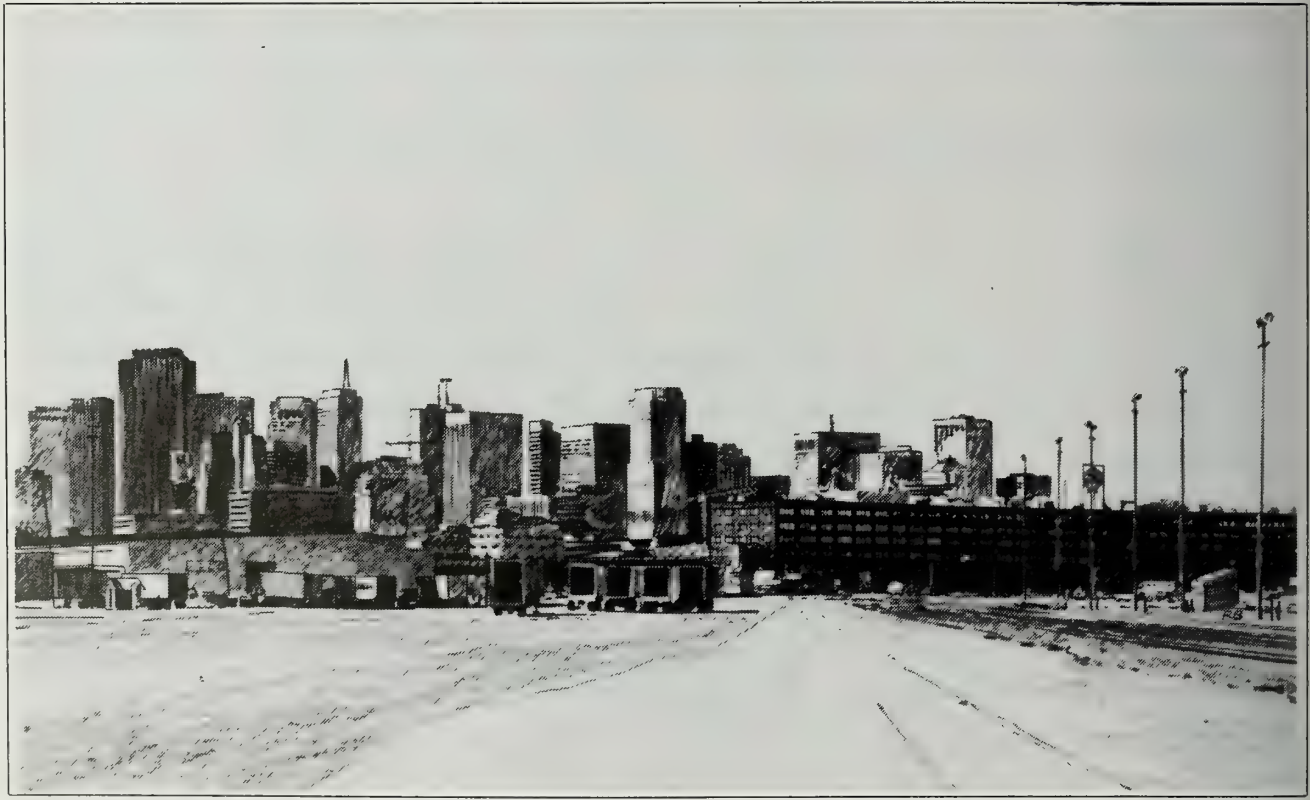
Approximately in the center of the Project Area is the middle of the former railroad yards, about one block north of 16th Street. Most tracks were removed in 1987. The remaining tracks are not in use and much of the area in the view is vacant (see Viewpoint 5, Figure VI.I.4). To the north are views of the downtown San Francisco skyline, and to the east, the China Basin Building and the Fourth Street drawbridge.

Owens Street North of 16th Street

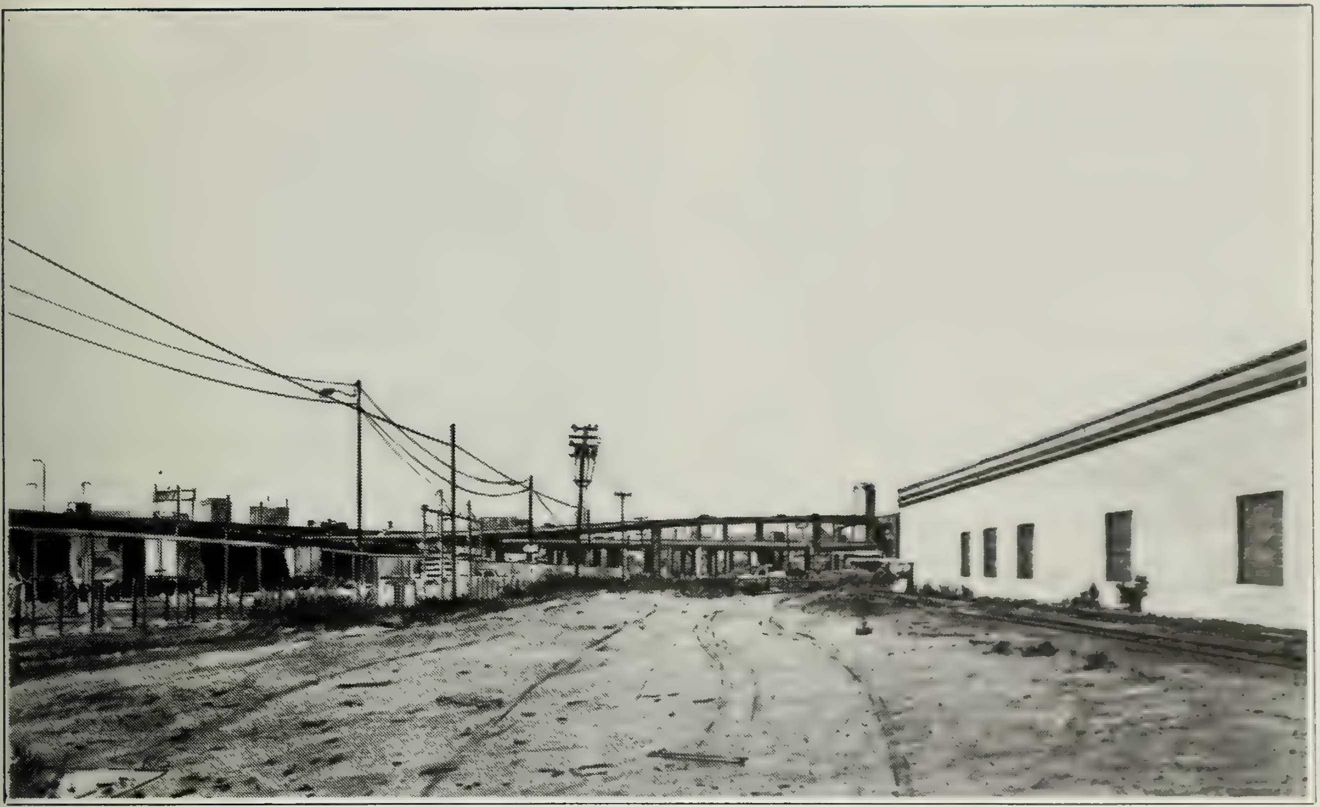
Looking northwest along Owens Street, the predominant feature is the I-280 Freeway near Channel Street, and the elevated Sixth Street off-ramp (see Viewpoint 6, Figure VI.I.4). The Hilton Hotel tower is prominent among other downtown high-rise buildings north of the freeway.



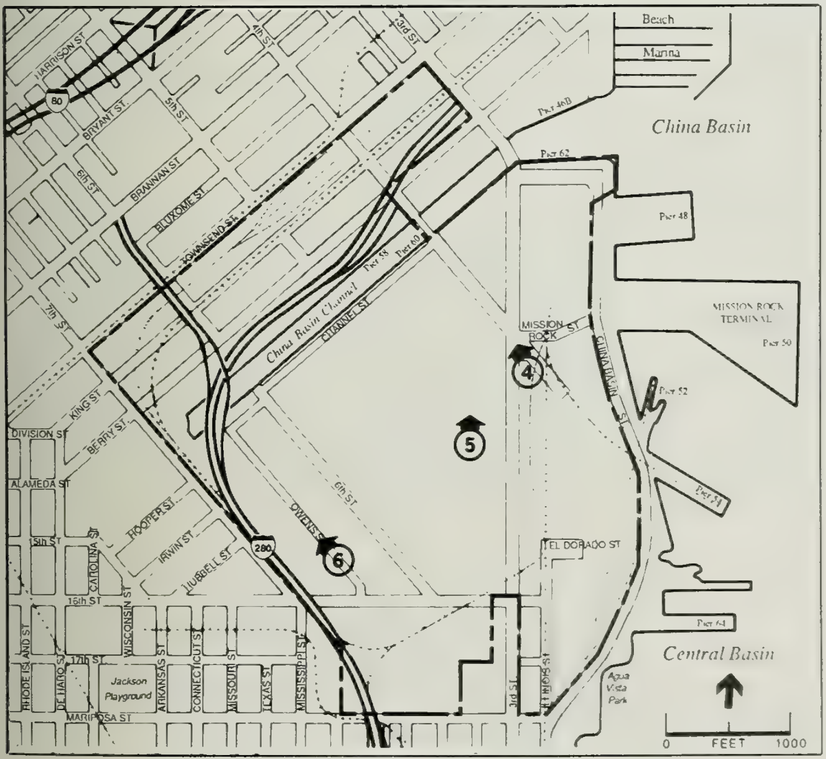
VIEWPOINT 4: Third, Fourth and Mission Rock Streets



VIEWPOINT 5: Former Southern Pacific Railyards



VIEWPOINT 6: Owens Street North of 16th Street


Beach
Marina
China Basin
HARRISON ST
80
BRYANT ST
5th ST
4th ST
3rd ST
6th ST
BRANNAN ST
BLUXOME ST
TOWNSEND ST
Pier 46B
Pier 62
Pier 48
Pier 58
Pier 60
7th ST
China Basin Channel
CHANNEL ST
MISSION ROCK TERMINAL
Pier 50
MISSION ROCK ST
CHINA BASIN ST
4
Pier 52
KING ST
BERRY ST
DIVISION ST
5
ALAMEDA ST
6th ST
Pier 54
HOOPER ST
OWENS ST
15th ST
CAROLINA ST
IRWIN ST
280
6
HUBBELL ST
EL DORADO ST
16th ST
WISCONSIN ST
Pier 64
RHODE ISLAND ST
DE HARO ST
17th ST
Jackson Playground
ARKANSAS ST
CONNECTICUT ST
MISSOURI ST
TEXAS ST
MISSISSIPPI ST
3rd ST
ILLINOIS ST
Central Basin
Agua Vista Park
MARIPOSA ST
0
FEET
1000

Mission Bay

OURCE: Roger Owen Boyer and Associates

FIGURE VI.I.4
EXISTING VIEWS -
4. THIRD, FOURTH AND MISSION ROCK STREETS
5. FORMER SOUTHERN PACIFIC RAILYARDS
6. OWENS STREET NORTH OF 16TH STREET

Urban Design Plan

The Urban Design Plan, an Element of the San Francisco Master Plan, enumerates objectives and policies concerned with the City's physical character, its relation to its natural setting, standards for new development, and for preservation of open space and historic and architectural resources./7/ The plan has four objectives relating to: city pattern, conservation, major new development, and neighborhood environment issues. Objective 1 deals with "emphasis on the characteristic pattern which gives to the City and its neighborhoods an image, a sense of purpose, and means of orientation." Policies to implement this objective include protection of major views, reinforcement of existing street patterns, recognition of the total effect of buildings seen together and of the boundaries and connections among districts, and increasing the visibility of major destination areas.

Objective 2 is "conservation of resources which provide a sense of nature, continuity with the past, and freedom from overcrowding." Policies for this objective call for preservation of remaining natural areas, avoiding encroachment on San Francisco Bay, preservation of notable historic and architectural landmarks, respecting the character of older development in the form of new buildings, and a presumption against giving up public street areas for private uses.

Objective 3 calls for "moderation of major new development to complement the City pattern, the resources to be conserved, and the neighborhood environment." Policies for this objective are to promote harmony in the visual relationships between new and older buildings, avoid extreme contrasts in color or shape in new buildings, and relate the bulk, height and form of new buildings to existing development patterns and to open space. Policies also address the special urban design needs in development of large sites.

Objective 4 is for "improvement of neighborhood environment to increase personal safety, comfort, pride and opportunity." Policies for this objective include protecting or buffering residential areas from noise, pollution and physical danger of heavy traffic, providing adequate walkways and parking, emphasizing local commercial centers, and providing adequate recreation space in neighborhoods.

Table VI.I.2 compares policies of the Urban Design Plan with the characteristics of the Alternatives. The table does not enumerate individual urban design policies, but compares the overall intent of the policies to the major urban design characteristics of each Alternative.

TABLE VI.I.2: RELATIONSHIP BETWEEN APPLICABLE URBAN DESIGN POLICIES OF THE MASTER PLAN AND MISSION BAY ALTERNATIVES AT BUILD-OUT/2020

Objectives and Policies	Alternative A	Alternative B	Alternative N
Objective 1 - City Pattern Emphasis of the Characteristic Pattern Which Gives to the City and its Neighborhoods an Image, a Sense of Purpose, and a Means of Orientation.			
Summary of Policies Policies include protection of major views, reinforcement of existing street patterns, recognition of the total effect of buildings seen together, recognition of boundaries of neighborhoods and enhancement of connections among districts, increasing the visibility of major destination areas and routes for orientation, use of landscaping to define open space and recreation amenities, character of local streets and local activity centers.	Alternative A would alter views of the Bay from Potrero Hill. New development in Mission Bay, up to eight stories high, would reduce views of Potrero Hill and Downtown. Views of China Basin Channel would be enhanced by new Project Area open space. North of China Basin Channel, the street pattern would follow the South of Market northeast-southeast grid of major streets; south of the channel, the street pattern would have a north-south orientation characteristic of Potrero Hill and the Mission District.	Alternative B would alter views of the Bay from Potrero Hill. New buildings would reduce views of Potrero Hill and Downtown from Mission Bay. Major open space and wetlands features would be visible in Mission Bay. Alternative B street patterns generally would follow the northeast/southwest grid of South of Market, in contrast to the north-south grid of Potrero Hill.	Alternative N industrial and warehouse uses would generally range up to two to four stories, and office buildings near Third and Townsend would range up to eight stories. These would have more limited view blockage effects than Alternatives A or B. However, Alternative N would not include major open space that could enhance views of the Project Area. Alternative N patterns would generally follow the South of Market northeast/southwest grid.
	Alternative A would have office and medium-high to high density residential areas and S/LI/RD development of larger buildings north of the channel, along Owens Street, I-280 and 16th Street. The central portion of the site would be developed with medium-density residential and retail uses and open space. This would create a "bowl" pattern of more intense development around less intense development. The pattern visually would relate the existing flat topography of the Project Area to higher elevations of Potrero Hill, and to higher building heights of downtown San Francisco.	Alternative B would have medium-high density residential uses north of the channel and south of 16th Street, medium- and low-density residential areas, and open spaces would occupy the central area of these. To a lesser degree than Alternative A, this would create a "bowl" pattern relating the flat topography of the Project Area to Potrero Hill and downtown through higher building heights at the perimeter of the Project Area.	Alternative N would continue and expand the industrial/warehouse development of the Project Area. Incremental replacement of vacant areas formerly occupied by railroad yards or older warehouses would not assure a coherent scale related to Potrero Hill or downtown.

(continued)

TABLE VI.I.2: RELATIONSHIP BETWEEN APPLICABLE URBAN DESIGN POLICIES OF THE MASTER PLAN AND MISSION BAY ALTERNATIVES AT BUILD-OUT/2020 (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
	Open space north and south of the channel and east of Third Street at the Bay would be evocative of former Mission Bay, and together with major open space at the mouth of China Basin Channel would enhance shoreline access to the channel and part of the Bay. The Central Square would be a focus of the neighborhood-serving retail area. Those open spaces would be visible from I-280, Third, Fourth and Eighth Streets, the major road approaches to the Project Area, and would be orientation landmarks for Mission Bay.	Open space north and south of the channel would be part of an open space corridor from the channel to the Bay, and would include new wetlands open space. As with Alternative A, open space would be orientation landmarks for Mission Bay.	Although no new public open space or major street landscaping would be created, landscape improvements of a 25-foot-wide open space band would be provided north and south of China Basin Channel.
	S/LI/RD activities near Seventh Street could relate to adjacent Showplace Square uses. S/LI/RD uses south of 16th Street would relate to activities in Lower Potrero Hill.	The primarily residential uses of Alternative B would notably differ from adjacent showroom, light industrial and service uses in Showplace Square, South of Market or Lower Potrero Hill.	The M-2 Industrial uses of Alternative N would continue the pattern of similar uses in South of Market, Showplace Square and Lower Potrero Hill.
	Street landscaping and lighting in Mission Bay would be required to be master-planned to provide consistent orientation for travellers.	Same as Alternative A.	Street landscaping and lighting would be provided incrementally, in individual developments and might not necessarily reflect a coherent plan for the Project Area.
Objective 2 - Conservation of Resources Conservation of Resources which Provide a Sense of Nature, Continuity with the Past, and Freedom from Overcrowding.			
Summary of Policies Policies include preservation of remaining natural areas and open space, avoiding encroachment on San Francisco Bay, preservation of notable historic and architectural landmarks, respecting the character of older development in the form of new buildings, and a presumption against giving up public street areas for private uses.	Alternative A would dredge the channel and improve the existing shoreline of China Basin Channel and would increase shoreline open space without encroaching on the Bay.	Alternative B would create new wetlands along China Basin Channel, near Pier 48 and south of Pier 54.	Alternative N would not change or expand major open space along the channel or the Bay. It would provide an improved 25-foot-wide open space setback north and south of the channel.

(continued)

TABLE VI.I.2: RELATIONSHIP BETWEEN APPLICABLE URBAN DESIGN POLICIES OF THE MASTER PLAN AND MISSION BAY ALTERNATIVES AT BUILD-OUT/2020 (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
	Alternative A would preserve the architecturally notable closed Fire Station 30, which could be used for community facilities. Most existing industrial or service buildings would be removed. The Third and Fourth Street bridges would be preserved. The scale of new development of Alternative A would include more intense uses, up to eight stories, and larger buildings near existing office, wholesale and light industrial uses in South of Market and Showplace Square, and medium-density residential and retail uses, up to seven stories, in the central portion of the Project Area. New buildings would likely contrast with scale and materials of older development in adjacent areas.	Alternative B would not preserve closed Fire Station 30; other community services would be provided at that site. The Third and Fourth Street bridges would be preserved. Alternative B would not include high-density residential uses. It would include one office block up to eight stories. Therefore, the overall scale of buildings would be reduced, compared to that of Alternative A. New buildings might contrast with scale and materials of older development in adjacent areas.	Alternative N would preserve and could reuse closed Fire Station 30, an architectural resource, as a fire house or for other community services. The Third and Fourth Street bridges would be preserved. Alternative N would include office buildings up to eight stories only on one block. It would not include high-density residential uses. The overall scale of buildings would be reduced, compared to that of Alternative A or B. New buildings might contrast with scale and materials of older development in adjacent areas.
	Alternative A would require vacation of certain public streets east and west of Third Street, notably Sixth Street and Illinois east of Third. New Project Area streets would provide access to residential, retail, open space and S/LI/RD uses, would relate to existing street grids in South of Market and Lower Potrero Hill, and would require permanent vacation of some undeveloped streets.	Alternative B would require vacation of certain existing streets east and west of Third Street including Sixth, Illinois and China Basin Streets, and realignment of Mission Rock Street. New Project Area streets would provide access to residential, retail, open space and S/LI/RD uses, would relate to South of Market street patterns, and would require vacation of some undeveloped streets.	Alternative N would not require vacation of existing streets. It would include new streets to serve development.
Objective 3 - New Development Moderation of Major New Development to Complement the City Pattern, the Resources to be Conserved, and the Neighborhood Environment.			
Summary of Policies Policies include promoting harmony in the visual relationships between new and older buildings, avoiding extreme contrasts in color or shape in new buildings, and relating the bulk, height and form of new	Mission Bay development will ultimately replace almost all existing buildings in the Project Area and establish a new context. The new development would relate to open space and architectural resources as discussed above under Objectives 1 and 2. Color, shape, height and bulk of new buildings in	Same as Alternative A.	Scale of development in Alternative N is discussed above under Objective 2. Color, shape, height and bulk of new buildings would be guided by the City Planning Code. Unlike Alternatives A and B, Alternative N would not have overall design guidelines that would prescribe how a plan for the area should be developed.

(continued)

TABLE VI.I.2: RELATIONSHIP BETWEEN APPLICABLE URBAN DESIGN POLICIES OF THE MASTER PLAN AND MISSION BAY ALTERNATIVES AT BUILD-OUT/2020 (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
buildings to existing City development patterns and to open space. These concerns are heightened in development of large sites which therefore have special urban design needs. Higher heights in new development should relate to local activity or employment centers.	Alternative A, which cannot be determined at this time, would be guided by City Planning Code requirements, design review procedures, and any specific design guidelines adopted for Mission Bay as part of the development agreement.		
	Pages VI.I.26-33 discuss the effects of Alternative A on views of open space, and pp. VI.I.57-VI.62 discuss potential shadow effects on Project Area open space.	Pages VI.I.33-VI.34 discuss the effectsof Alternative B on views of open space, and pp. VI.I.62-VI.66 discuss potential shadow effects on Project Area open space.	Pages VI.I.34-VI.36 discuss the effects of Alternative N on views of open space, and pp. VI.I.66-VI.69 discuss potential shadow effects on Project Area open space.
	Higher office and high-density residential building heights would be located near employment centers.	Retail activities would be concentrated near more-intense MHDR and MDR residential uses, relating higher heights to local activity. Employment centers in Alternative B would be more limited than in Alternative A.	Alternative N would not include a distinctive activity center.
Objective 4 - Neighborhood Environment Improvement of the Neighborhood Environment to Increase Personal Safety, Comfort, Pride and Opportunity. Summary of Policies			
Policies for this objective include protecting or buffering residential areas from noise, pollution and physical danger of heavy traffic; providing adequate lighting, walkways and parking; emphasizing local commercial centers; and providing adequate and varied kinds of recreation space, public and private, in neighborhoods. Local activity or government office centers should be more prominent and off-street parking should be screened.	Alternative A would include a hierarchy of streets, planned to separate through- and truck-traffic from local-serving routes to reduce noise and air pollution in residential areas. Residential and non-residential uses fronting the same streets, as would occur on Berry, Owens, Third, and 16th Streets, would be impacted without landscaping or limited residential access on the major street to buffer these conflicts. Mission Bay plans would be required to include detailed lighting, landscaping and walkway guidelines.	Alternative B would have an hierarchy of streets. Residential and non-residential uses on Third, Owens and 16th Streets would be affected as in Alternative A.	Alternative N would not include residential uses; the street hierarchy and landscaping would be oriented to M-2 light industrial uses.
	Alternative A would have a neighborhood commercial area and community facilities, on the north-south retail street focused on the Central Square, intended to have a strong pedestrian orientation.	Neighborhood commercial uses would occur on King Street, Owens/Hooper, and Dagget Streets, and community services would focus on Third/Fourth and Owens/16th Streets.	Employee-serving retail uses would be located on Third Street. There would not be a neighborhood commercial center.

(continued)

TABLE VI.I.2: RELATIONSHIP BETWEEN APPLICABLE URBAN DESIGN POLICIES OF THE MASTER PLAN AND MISSION BAY ALTERNATIVES AT BUILD-OUT/2020 (continued)

Objectives and Policies	Alternative A	Alternative B	Alternative N
	Additional community services would focus at the Third-Fourth Streets intersection. Local retail uses would also be planned north of the channel to serve offices and residential areas.		
	Public open space in Alternative A would include a range of passive and active use areas. In addition, the open space corridor extension of Fourth Street east of Third Street, would help provide a visual transition between housing and port-related uses. Residential and office buildings would also include private plazas or greens. Off-street structured or at-grade parking would be provided for hotel, office, S/LI/RD and residential uses. Access across sidewalks could potentially conflict with pedestrian circulation.	Public open space in Alternative B would include a range of passive and use areas. (No active recreation uses would be provided by 2000.) Residential buildings would also include private plazas or greens. Off-street parking for commercial uses would be more limited under Alternative B. Access across sidewalks could potentially conflict with pedestrian circulation.	As Alternative N would not be a residential neighborhood, it would not include major new public open space or recreation areas. An open space strip would be provided north and south of the Bay channel.
	See VI.D. Community Services and Infrastructure, Recreation and Parks, p. VI.82-VI.D.83.	See VI.D. Community Services and Infrastructure, Recreation and Parks, p. VI.83-VI.D.85.	See VI.D. Community Services and Infrastructure, Recreation and Parks, p. VI.D.85-VI.D.86.

SOURCE: Environmental Science Associates, Inc.

IMPACT

The Architectural Resources and Urban Design Impact section discusses six major topics, at build-out, when full effects of physical development of Mission Bay Alternatives would be evident. Those effects would represent worst-case impacts on view blockage or potential shadows on open space. Areas that would be developed by 2000 would have street-level urban design conditions similar to those analyzed for 2020. Architectural Resources identifies direct and indirect effects on on-site and off-site buildings. Visual Quality discusses overall potential scale, height and view blockage as seen from long-range vantage points. Urban Design illustrates and discusses streetscape views and building design issues at six street-level locations. Potential shadow effects of the Alternatives on proposed open space and pedestrian areas are identified, and potential adverse street-level wind effects of structures in Mission Bay are discussed.

ARCHITECTURAL RESOURCES

No buildings in the Mission Bay Project Area are rated by the Department of City Planning (DCP) and Heritage surveys; demolition of existing buildings would not affect any documented architectural resources. However, closed Fire Station 30 is considered of architectural and historic interest. The building may be eligible for listing on the National Register of Historic Places (see p. VI.I.4 and VI.J. Cultural Resources, p. VI.J.16).

Build-Out/2020

Architectural resources located within 1,000 feet of the Project Area boundary that were rated by the DCP and Heritage surveys (see Figure VI.I.1, p. VI.I.2) could be indirectly affected by the development in the Mission Bay Project Area. VI.B. Land Use, Business Activity and Employment, pp. VI.B.106-VI.B.123, discusses the effects of the Alternatives on land uses in the vicinity, including development adjacent to the Project Area on Townsend Street and in Showplace Square. Economic pressure might cause existing buildings in those Nearby Areas to be altered for new uses or to be demolished and replaced as land values increase. Building-specific effects cannot be projected.

Alternative A

Alternative A would preserve and reuse closed Fire Station 30 for fire department or community services uses by the year 2000 (see VI.D. Community Services, Fire Protection, p. VI.D.36). That would maintain the station's architectural and historic integrity.

Alternative A would not affect directly architectural resources adjacent to the Project Area. The Third and Fourth Street drawbridges and China Basin Building are assumed to remain. New construction in Mission Bay fronting on Townsend and Seventh Streets would change the urban design context of existing older brick and masonry buildings listed on those streets in DCP or Heritage surveys (see Figure VI.I.1, p. VI.I.2). The expected urban design context in Mission Bay is discussed below, pp. VI.I.37-VI.I.51. Alternative A development of office space along Townsend would be consistent with the portion of the service/secondary Office District along the north side of Townsend in the South of Market Plan, Proposal for Citizen Review./8/ The proposed South of Market Plan calls for preservation of architecturally significant buildings, including those fronting the north side of Townsend adjacent to the Project Area (see VI.A. Public Plans, Policies and Permits, p. VI.A.9, for a summary of the South of Market Plan). S/LI/RD space near Seventh Street could complement existing wholesale/showroom uses in rehabilitated buildings in Showplace Square.

Alternative B

Closed Fire Station 30 would be demolished and replaced by new streets and community services uses by the year 2020, although not by 2000. Because Alternative B would include primarily residential uses, it could limit available office space South of Market and could increase conversion of older buildings housing service and light industrial uses elsewhere in South of Market to office uses (see VI.B. Land Use, Business Activity and Employment, p. VI.B.111). Other effects of Alternative B would be the same as Alternative A.

Alternative N

Alternative N, as with Alternative A, would retain and reuse closed Fire Station 30. Alternative N would continue rail and Caltrain terminal uses along Townsend and Seventh Streets and so would not change the existing context of architectural resources along those streets west of Fourth Street. Alternative N would provide light industrial space including some offices that would reduce development pressures on similar space in South of Market. That could reduce conversion of older buildings to such uses (see VI.B. Land Use, Business Activity and Employment, p. VI.B.112).

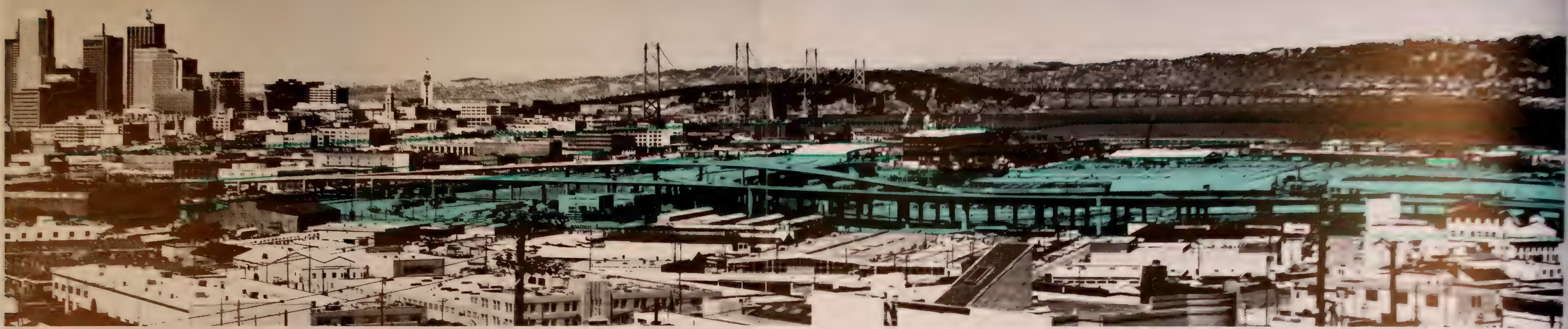
VISUAL QUALITY

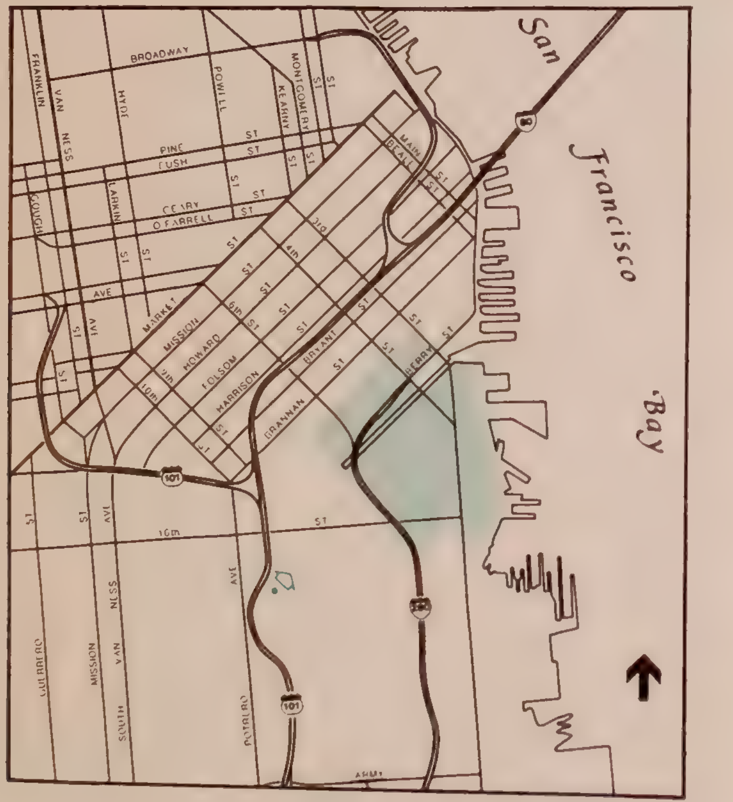
Build-Out/2020

New buildings in Mission Bay would affect views of the Project Area from surrounding areas. Figure VI.I.5, pp. VI.I.28-VI.I.29, is a panoramic view from Potrero Hill near the Project Area with lines marking the upper limits of building heights that may obscure all or part of the existing view from that location; existing views from that location are discussed on pp. VI.I.5-VI.I.6. The upper dotted line is 110 feet high, representing the upper limit of eight-story buildings, the maximum height planned for Mission Bay. Stairway structures and mechanical penthouses could extend above that height as permitted by the City Planning Code./9/ A 40-foot height line and ground level also are indicated. The 40-foot height approximates that of a three-story office building or a four-story residential building. The three lines are drawn at the furthest point in the Mission Bay Project Area from the viewpoint. The lines therefore represent the highest condition that would occur as seen at that location on Potrero Hill. The lines do not imply that a solid wall of buildings would be constructed to this height. Actual view blockage would depend upon site plans, design, height, bulk and setbacks of specific buildings, and open space and roadway location./10/

Alternative A

Views from Potrero Hill. Existing buildings in the Project Area would be demolished and replaced with new structures by the year 2020, with the exception of the Channel Street Pump Station at China Basin Channel and closed Fire Station 30. The new buildings would vary in height from three stories up to eight stories, plus mechanical penthouses as permitted by the City Planning Code. The height of an eight-story office building could vary from 98 feet to 110 feet high. In addition, mechanical penthouses could extend up to 16 feet above the main building height, resulting in an average overall height of about 120 feet for office buildings./9/ (Therefore, eight-story office buildings would be as high as the upper dotted line on Figure VI.I.5.) The height of an eight-story residential building

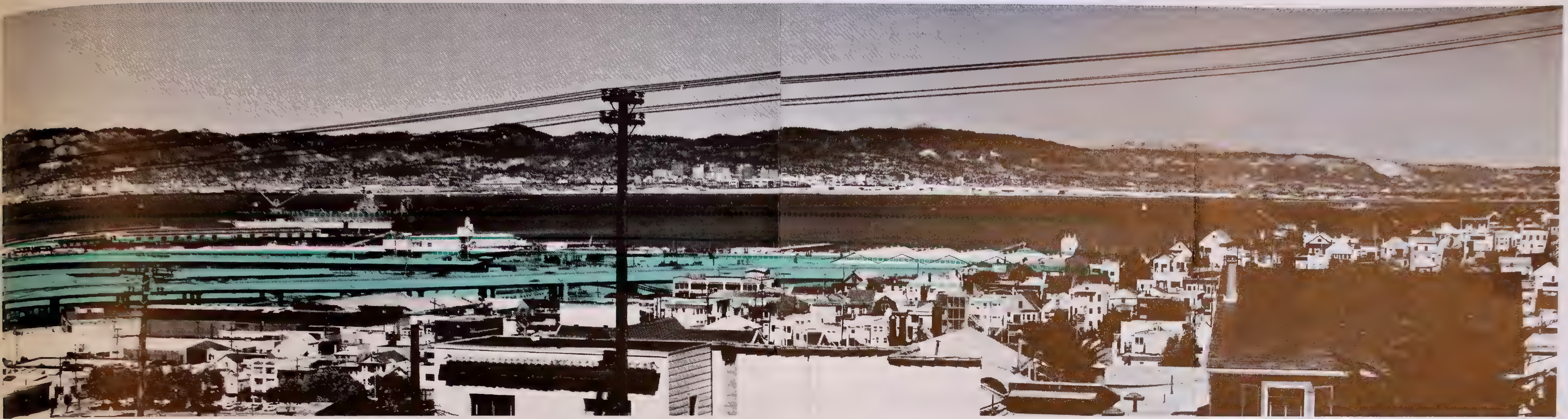



San Francisco Bay
BROADWAY
FRANKLIN
VAN NESS
HYDE
POWELL
MONTGOMERY
PINE
BUSH
GEARY
O'FARRELL
MARKET
MISSION
HOWARD
FOLSOM
HARRISON
BRYANT
BRANNAN
TOWNSEND
16th ST
101
280
80
GUERRERO
MISSION
SOUTH VAN NESS
POTRERO
ARMY

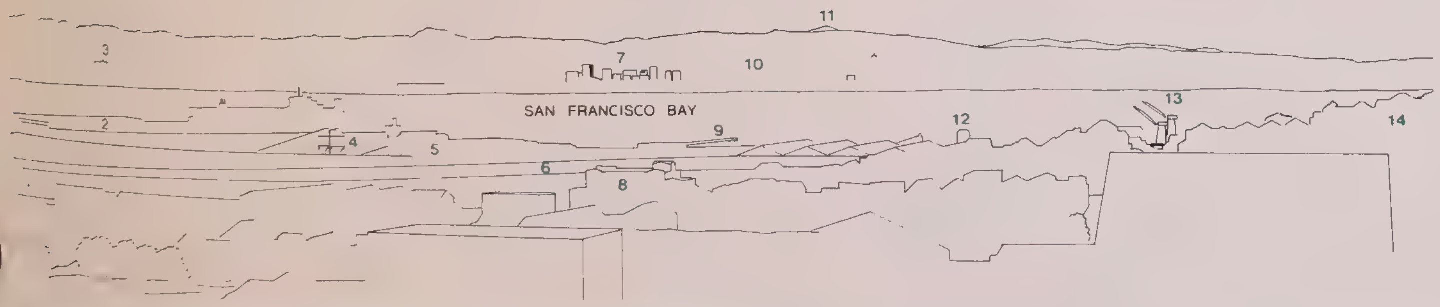
The photograph was taken from the roof of Patrick Henry School, 639 Vermont Street near 18th Street, to provide an unobstructed view of the Project Area. Although the viewpoint is not publicly accessible, it is similar to views partially available from streets and residences on Potrero Hill.

1. DOWNTOWN SAN FRANCISCO HIGHRISES
2. FIFTH STREET ON-RAMP TO I-80
3. BAKER HAMILTON DESIGN CENTER
4. TOWNSEND STREET
5. EMBARCADERO FREEWAY
6. CLOCK TOWER - 461 SECOND STREET NEAR BRYANT STREET
7. UNION 76 SIGN
8. SIXTH STREET ON-RAMP TO I-280
9. SIXTH STREET OFF-RAMP FROM I-280
10. CHANNEL STREET PUMPING STATION
11. SMOKESTACK - 178 TOWNSEND NEAR THIRD STREET
12. CALTRAIN COMMUTE TERMINAL
13. UNUSED I-280 STUB
14. SAN FRANCISCO - OAKLAND BAY BRIDGE
15. YERBA BUENA ISLAND
16. CHINA BASIN BUILDING
17. LEFTY O'DOUL BRIDGE AT THIRD STREET
18. PETER J. MALONEY BRIDGE AT FOURTH STREET
19. CHINA BASIN CHANNEL
20. SEVENTH STREET
21. [illegible] STREET
22. I-280
23. [illegible]
24. [illegible]
25. [illegible]
26. [illegible]
27. [illegible]
28. [illegible]
29. [illegible]
30. [illegible]

1
3
4
8
9
10
12
14
20



1. SEVENTH STREET
2. PIER 50
3. CLAREMONT HOTEL
4. KAISER SAND AND GRAVEL
5. PIER 54
6. I-280
7. DOWNTOWN OAKLAND
8. 135 MISSISSIPPI STREET NEAR MARIPOSA STREET
9. PIER 64
10. OAKLAND HILLS
11. MT. DIABLO
12. SAND AND GRAVEL CONVEYOR
13. PORT CRANES AT 19TH STREET NEAR ILLINOIS STREET
14. POTRERO HILL



🟩 PROJECT AREA

- - - - - PROJECT AREA BOUNDARY

HEIGHT LIMITS (Lines drawn at furthest point from Potrero Hill viewpoint):

•••••••••• 110 feet

—— 40 feet

---------- GROUND LEVEL

Mission Bay

FIGURE VI.I.5
MISSION BAY HEIGHT LIMITS – VIEW FROM POTRERO HILL

SOURCE: Roger Owen Boyer and Associates

would vary from 83 feet to 90 feet, or from 93 feet to 105 feet with penthouses, an average height of about 100 feet. The top of eight-story residential buildings would be about 4 to 17 feet lower than the 110-foot line on Figure VI.I.5.

The overall scale of buildings in Alternative A would vary, with more-intense office, S/LI/RD and HDR buildings on the north, west and south around MHDR areas. The central portion of the Project Area would be MDR uses focused on the Central Square. That range of scales would create a "bowl" effect, creating a transition from the flat topography of Mission Bay to higher elevations of Potrero Hill to the south, and to the scale of development of larger buildings in South of Market and downtown San Francisco.

When viewed from Potrero Hill, the eight-story office buildings in the Project Area north of China Basin Channel east of Sixth Street would generally appear as high as the upper dotted line on Figure VI.I.5, and would thus obscure views of lower buildings in the South of Market area, but not the downtown San Francisco skyline. (This view is from one representative point on Potrero Hill. As noted in note /6/, the extent of long-range views discussed here would vary at other locations in Potrero Hill. For example, views from lower elevations would not encompass the entire Project Area, because of intervening buildings.) New views would include portions of new open space north and south of the channel. Alternative A would not include buildings tall enough to obscure any part of the Bay Bridge, the Berkeley Hills or Yerba Buena Island from this viewpoint. Parts of the major open space east of Third Street would be visible between new buildings. Part of the Bay visible between the China Basin Building and the lower portion of the Bay Bridge might be partially obscured by new buildings constructed along King and Third Streets. West of Sixth Street along Townsend Street, new S/LI/RD buildings in Mission Bay would be up to 70 feet tall. Those buildings would not be as high as the 110-foot line in Figure VI.I.5; they would partially block the view of existing buildings on the north side of Townsend Street.

The removal of the I-280 stub also would change views north of the channel. Alternative A would have MDR and HDR averaging 100 feet in height, replacing the freeway between Third and Sixth Streets. The freeway ranges in height from about 30 to 40 feet above grade, and the new housing would be about two-and-one-half to three times the height of that structure. From the remaining portion of I-280 on the west side of the Project Area, S/LI/RD (up to four stories) and residential (up to eight stories) buildings near Owens would be visible, and would likely block views of open space and the Bay across the Project Area, depending upon building configuration and location.

West of Third Street, Alternative A would include a hotel up to 110 feet high (excluding mechanical penthouse) along Third Street, between the channel and the intersection of Third and Fourth Streets. The hotel could partially block the views from Potrero Hill of the Bay south of China Basin Channel, depending on the actual design and location of the building. Other MDR buildings west of Third Street would be from 60 to 90 feet high and would block views from Potrero Hill of the Third and Fourth Street bridges, China Basin Channel and waterfront sheds along China Basin Street. The buildings would not obscure views of the Bay Bridge or East Bay shoreline.

East of Third Street, MDR buildings would range in height from about 60 to 80 feet. Those buildings would obscure most of the pier sheds along China Basin Street and parts of the Bay. Ships anchored at the end of Pier 50 would be partially visible. The shoreline along the west side of the Bay would be obscured by new buildings. Closed Fire Station 30, to be retained with Alternative A, would not be visible from the Potrero Hill viewpoint. The major open space east of Third would be partially visible between towers of 60- to 90-foot residential buildings west of Third.

With Alternative A, new office buildings north of the channel along Townsend Street could be of a similar height. If all of the buildings were constructed to the maximum height, views of this area could appear as a "bench" of buildings. Bulk controls, if imposed as part of a development agreement, could require setbacks or other bulk controls at upper floors, but would not limit further the maximum height./11/

Views from Other Areas and the Bay. When viewed from street-level areas north of the Project Area, existing buildings in the South of Market area would limit views of Mission Bay buildings except for views down streets. Views of the Project Area easterly or southerly from high-rise buildings in downtown San Francisco would include four- to eight-story office, residential and S/LI/RD buildings and open space, and depending upon their location and configuration, Project Area buildings could limit views of the Bay. Views from downtown would also vary from upper or lower floors. When viewed from the northwest from high-rise buildings, Alternative A would generally have the same characteristics as described above for the Potrero Hill view. The existing pier sheds along China Basin Street and the China Basin Building would be obscured, but views to the Bay, of the Bridge and of Potrero Hill would remain visible.

Views from the Bay, within about 500 feet of the shoreline, would include waterfront sheds at Piers 48 and 50 that would block views of new Mission Bay buildings less than 45 feet high; buildings higher than 45 feet would obscure views of Potrero Hill. Alternative A would not include buildings that would obscure the downtown San Francisco skyline viewed from the Bay.

Alternative B

Views from Potrero Hill. Existing buildings in the Project Area would be demolished and replaced with new structures by the year 2020, with the exception of the existing Channel Street Pump Station. New buildings would vary in height from three stories to eight stories, with maximum height of residential buildings, as described for Alternative A, averaging up to 100 feet high. North of the channel, residential buildings up to eight stories north of Berry Street would be visible from Potrero Hill and would be up to 100 feet high; or ten feet below the 110-foot line in Figure VI.I.5, pp. VI.I.28-VI.I.29. (See Chapter VII. Variations on Alternatives, p. VII.37-VII.41, for discussion of higher residential towers north of the channel.) From the Potrero Hill viewpoint, residential buildings would block views of buildings to the north. Alternative B would remove the I-280 stub, 30 to 40 feet above grade to provide open space and residential uses. The new open space at grade and medium-high-density residential buildings would be visible from Potrero Hill and from vehicles on the remaining portion of I-280 near the channel.

Alternative B would include a major open space from China Basin Channel southerly to the Bay. Development intensities would generally increase away from the open space: medium-high density residential uses north of the channel, and office uses east of I-280, compared to low- and medium-density residential to the south. Thus, overall density would decrease toward the center of the Project Area as with Alternative A, but the scale would be more uniform, predominantly medium-density residential areas and open space.

West of Third Street, Alternative B would provide open space north of the Third Street and Fourth Street intersection. That open space would retain and enlarge views of the Bay, the Embarcadero, and the Third and Fourth Street bridges. No buildings would obscure the Bay Bridge or the East Bay shoreline from the Potrero Hill viewpoint. Office buildings up to eight stories high between I-280 and Owens Street and other new buildings to the east would block existing views of the Project Area and the Bay from vehicles on I-280, depending upon the configuration and location of buildings. Views could be intermittently available between new buildings.

The area east of Third Street would have buildings ranging in height from about 60 to 100 feet. When viewed from Potrero Hill, those buildings would obscure most of the waterfront pier sheds long China Basin Street and parts of the Bay; ships anchored at the end of Pier 50 would be partially visible. The view of the shoreline along the Bay would be obscured by new buildings.

As with Alternative A, new office buildings along Townsend Street between Owens Street and I-280 under Alternative B, could be of a similar height, up to about 110 feet. If all of the buildings were constructed to the maximum height, views of this area would appear as a "bench" of buildings. Bulk controls could require setbacks or other bulk controls at upper floors, but would not further limit this maximum height.

Views from Other Areas and the Bay. When viewed from street level west of the Project Area, existing buildings would limit views of Mission Bay buildings, except for views down streets. Views easterly or southerly from high-rise buildings in downtown San Francisco would include the entire Project Area, primarily four- to eight-story residential buildings and open space from the channel to the Bay. The waterfront pier sheds along China Basin Street and the China Basin Building would be obscured, but the views from downtown of the Bay, the Bay Bridge and of Potrero Hill would generally remain, depending upon the view location and elevation downtown, and the configuration and location of Project Area buildings.

As with Alternative A, existing waterfront sheds at Piers 48 and 50 would block the view from the Bay, within about 500 feet of the shoreline, of new buildings that are less than 45 feet high. Buildings higher than 45 feet would obscure views of Potrero Hill. Alternative B would not include buildings that would limit views of the downtown skyline from the Bay.

Alternative N

Alternative N reflects future development of the Project Area under existing M-2 (Heavy Industrial) zoning as defined in the City Planning Code and taking into account Master Plan policies. By the year 2020, new M-2 Industrial and Port-Related/M-2 uses would be expected to be primarily buildings up to 40 feet in height for warehousing, distribution, transportation, industrial and port-related businesses; office space would be developed up to 105 feet in height on the Third and Townsend block which is outside the Central Basin Subarea. For purposes of analysis in this EIR, Alternative N assumes that development would be primarily lower rise buildings, similar in appearance to a business park. See V. The EIR Alternatives and Approval Process, pp. V.A.16-V.A.17, for a discussion of land use assumptions for Alternative N.

Thus, the overall scale of buildings in Alternative N is assumed to be more uniform than Alternatives A and B. Most M-2 buildings would be two to four stories. The major variations in scale would be the eight-story office buildings in the Third and Townsend block, and the continuation of the at-grade CalTrain rail corridor along Seventh and Townsend Streets.

City Planning Code Height and Bulk Districts for the Project Area, however, include 40-foot to 200-foot height districts (see Figure XIV.A.6, p. XIV.9)./12/ Therefore, 130-foot to 200-foot high (10- to 16-story) buildings potentially could be developed in the area bounded generally by the channel, Fourth, Third, 16th and Sixth Streets. (The potential for such high-rise development would be limited somewhat by the 5:1 Floor Area Ratio permitted in M-2 districts, and light industrial uses expected to build out in the Project Area with Alternative N, which usually locate in low-rise buildings. Tall buildings could be built on large sites, however.) The 200-foot height district is bounded roughly by Beaton Street, the channel, Fourth and Third Street and extends south of Daggett Street. An 80-foot district extends from the Banana Triangle east of Fourth and continues between Third and the north-south line of Illinois to Mariposa and Minnesota. The Third-Townsend-Fourth-King block is in a 105-foot height district, consistent with eight-story office uses assumed for that block. The height districts in the remainder of Mission Bay range from 40 to 50 feet, generally consistent with development scenarios for Alternative N (see Figure XIV.A.6, p. XIV.A.9).

Views from Potrero Hill. In views from Potrero Hill, many of the buildings in the Mission Bay Project Area would be demolished and replaced with new structures by the year 2020. Eight-story office buildings near Third and Townsend would obscure existing views of some buildings east and north of this block, in the area below the 110-foot line on Figure VI.I.5, pp. VI.I.28-VI.I.29. Other views of existing buildings along Townsend generally would remain unchanged with Alternative N; the removal of the 30- to 40-foot-high I-280 stub would allow development of industrial buildings up to 40 feet high. Many could be one or two stories. These buildings would not obstruct views from Potrero Hill.

West of Third Street, Alternative N would provide a new street grid. New buildings that could be constructed would be expected to vary in height from one to four stories. As stated on p. VI.I.34, the Alternative N scenario assumes development of M-2 buildings in that height range. However, under existing City Planning Code height limits, building between 130 and 200 feet high could be built south of the channel and west of Third. Such buildings would appear up to twice as high, when viewed from Potrero Hill, as the 110-foot line shown on Figure VI.I.5, pp. VI.I.28-VI.I.29, and would obscure views of portions of the Bay, Oakland Hills and Bay Bridge. Two- to four-story buildings would not have those effects.

The area east of Third Street would have buildings ranging in height up to 40 feet, but as discussed in VI.B. Land Use, Business Activity and Employment, p. VI.B.103, Alternative N development east of Third in 2020 is expected to be less intense than in other Mission Bay areas, with fewer new buildings and larger areas devoted to outdoor storage, loading on work areas. From Potrero Hill, these buildings would obscure most of the waterfront pier sheds along China Basin Street and parts of the Bay; ships anchored at the end of Pier 50 would be partially visible. Alternative N would have the least effect on existing views east of Third, compared to Alternatives A and B. Existing City Planning Code limits would permit 80-foot-high buildings east of Third. Such structures would limit views of the Bay from Potrero Hill.

Views from Other Areas and the Bay. When viewed from street level west of the Project Area, existing buildings would limit views of Mission Bay buildings, except for views down streets. New buildings would generally be one- to four-story light industrial uses, as described above. The existing pier sheds along China Basin Street and the China Basin Building would be partially obscured, but the views to the Bay, the Bridge, and of Potrero Hill would remain visible. When viewed from the Bay, the existing waterfront pier sheds at Piers 48 and 50 would block the views of new buildings less than 45 feet high; buildings higher than 45 feet would obscure views of Potrero Hill. Under existing zoning and height limits, buildings up to 200 feet high could be built west of Third and up to 80 feet east of Third. Those structures could obscure part of the downtown skyline seen from the Bay.

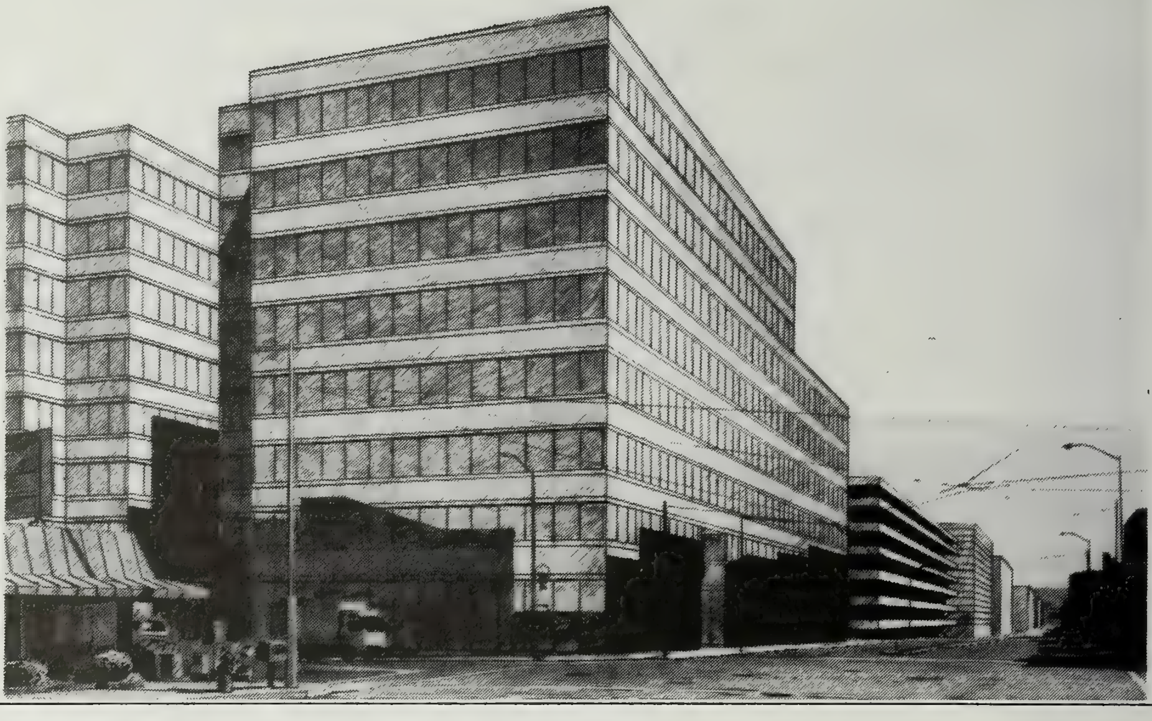
URBAN DESIGN

Build-Out/2020

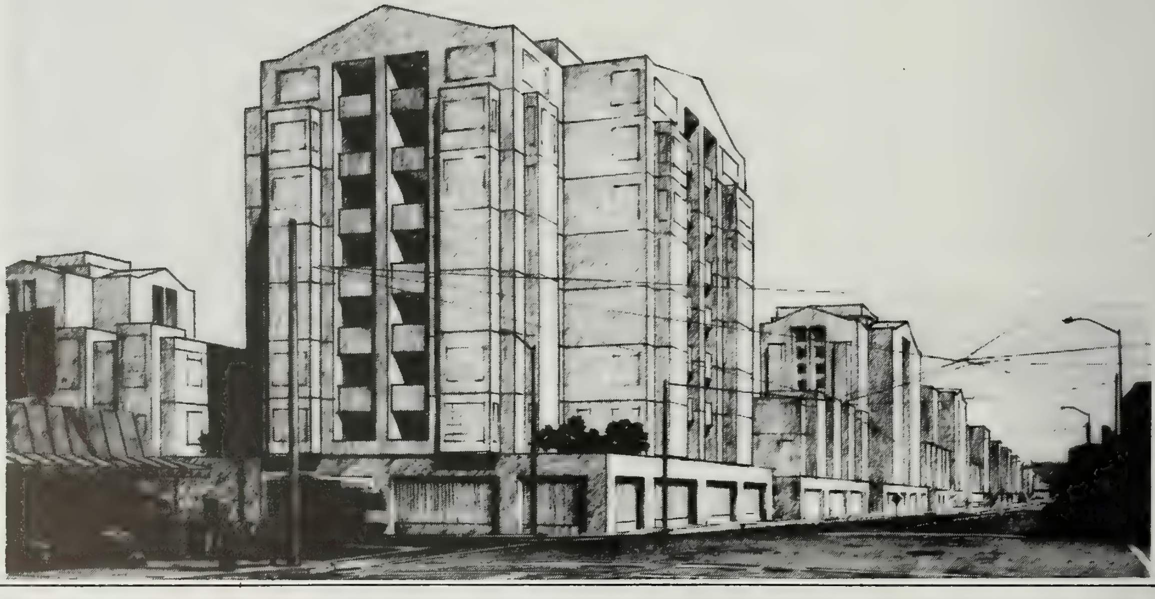
Figures VI.I.6 through VI.I.11 include buildings added to existing views of the Project Area shown in Figures VI.I.3 and VI.I.4, pp. VI.12–VI.I.13 and VI.I.16–VI.I.17, to illustrate each Alternative in the year 2020. The illustrations do not represent actual building proposals. They are conceptual designs that reflect potential zoning controls for each Alternative based on the criteria described in Appendix A, The EIR Alternatives, Table XIV.A.1, p. XIV.A.1. A variety of building configurations and design is possible, but the illustrations represent minimal compliance with City Planning Code requirements, and provide a comparative analysis of each viewpoint for each Alternative in the year 2020. Consistent with the Alternative N scenario for M-2 Industrial and Port-Related/M-2 development in the Project Area, the designs for Alternative N assume lower-scale buildings, rather than 80- to 200-foot buildings allowable under existing height limits in parts of the Project Area. See Chapter V. The EIR Alternatives and Approval Process, pp. V.A.16–V.A.17, for a discussion of land use assumptions for Alternative N.

Viewpoint 1 – Third and Townsend Streets

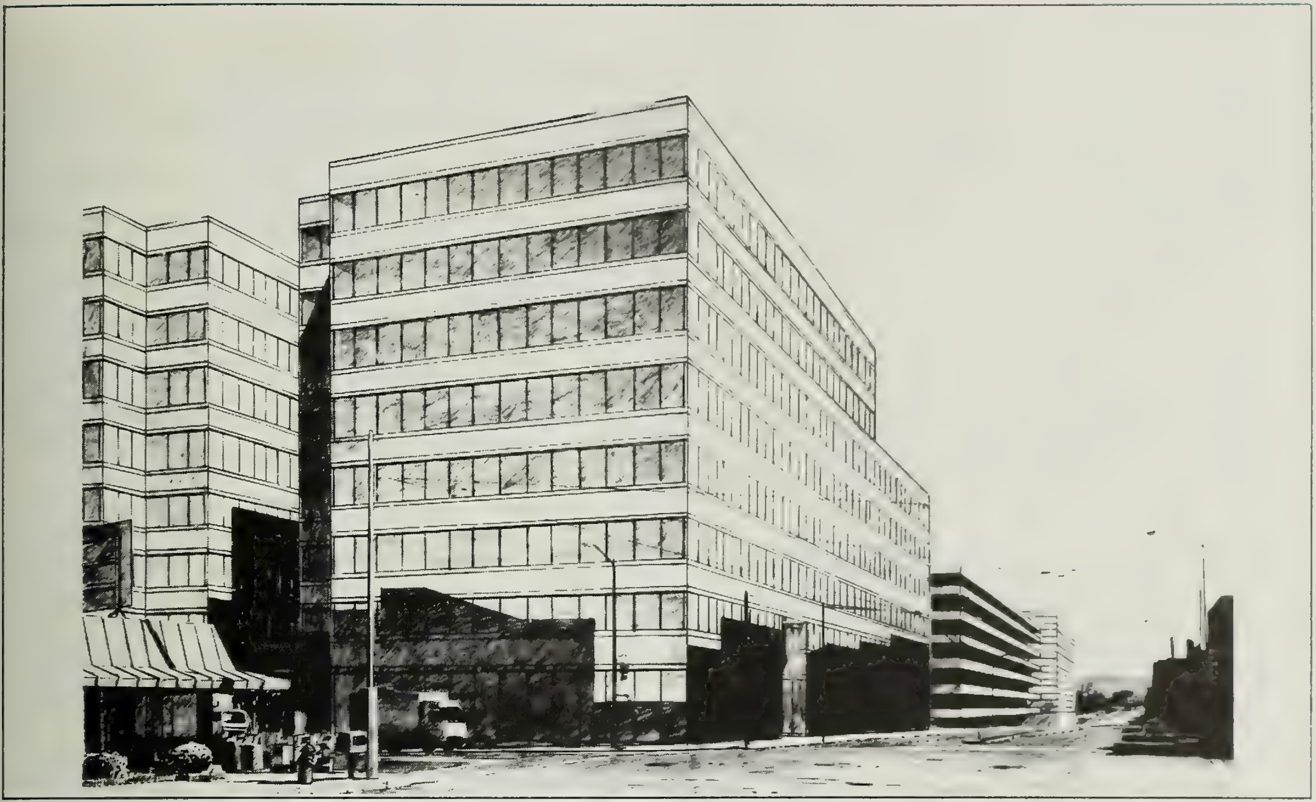
Alternative A. Views from Townsend Street and Third Street south would include eight-story office buildings and parking structures replacing the existing San Francisco RV park, Caltrain commute terminal and railroad tracks (see Figure VI.I.6). These buildings, with associated open space, would occupy all blocks along Townsend Street to Sixth Street. Open space would not be visible as it is assumed to be on the south (King Street) side of the buildings to maximize sun exposure, (and to present a conservative impacts scenario). First-floor retail uses in these buildings are also assumed to be located on the south side of the buildings, adjacent to the open space. The street-level frontage along Third and Townsend Streets is assumed to include offices, building entrances, exits, structural walls and parking garages. The buildings illustrated represent secondary office space with large floor areas (30,000 to 45,000 square feet per floor). City Planning Code building and bulk controls, assumed in these scenarios, limit the size of floors and dimensions of buildings above a specific height. Above 80 feet or six stories, the maximum width of these buildings would be 110 feet. The buildings shown are configured to meet these requirements.



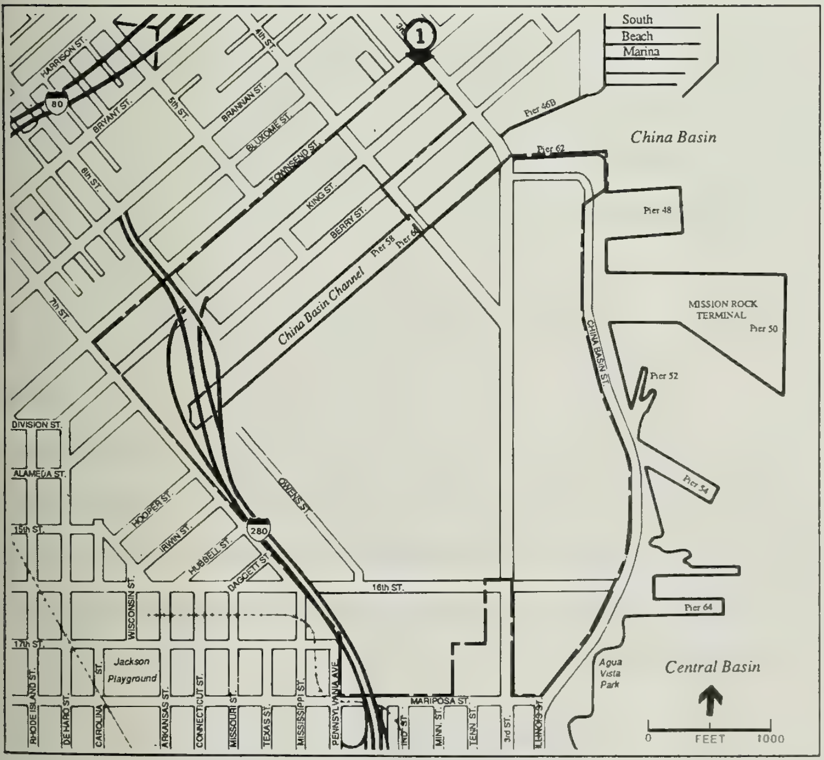
ALTERNATIVE A: Third and Townsend Streets (Viewpoint 1)



ALTERNATIVE B: Third and Townsend Streets (Viewpoint 1)



ALTERNATIVE N: Third and Townsend Streets (Viewpoint 1)



1
3rd
South
Beach
Marina
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
6th ST.
KING ST.
BERRY ST.
Pier 46B
China Basin
Pier 62
Pier 48
Pier 58
Pier 60
China Basin Channel
7th ST.
MISSION ROCK
TERMINAL
Pier 50
CHINA BASIN ST.
Pier 52
DIVISION ST.
ALAMEDA ST.
HOOPER ST.
IRWIN ST.
OWENS ST.
Pier 54
15th ST.
280
HUBBELL ST.
DAGGETT ST.
16th ST.
Pier 64
WISCONSIN ST.
17th ST.
Jackson
Playground
Agua
Vista
Park
Central Basin
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
MARIPOSA ST.
IND. ST.
MINN. ST.
TENN ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000

NOTE: The illustrations are building mass and view studies that incorporate conservative height and bulk assumptions to present a reasonable worst-case scenario of street-level views. The illustrations are not renderings of specific building designs, and do not represent the pedestrian or vehicular activity that may occur in the viewpoints.

FIGURE VI.I.6
ILLUSTRATION OF ALTERNATIVES -
VIEWPOINT 1: THIRD AND TOWNSEND STREET

URCE: Roger Owen Boyer and Associates

The new buildings would obscure the existing view of Potrero Hill and the China Basin Building south of Townsend. The ridge of Twin Peaks would remain visible down Townsend Street. Sidewalks along Third and Townsend Streets would include a narrow walkway with parking on the street side (parked vehicles are not shown to avoid obscuring building bases) and the blank walls of office buildings of similar eight-story height and parking structures on the other side. The new buildings would contrast in scale, bulk and facade materials with those of older masonry or brick, often ornamented, buildings fronting the north side of Townsend Street between Second and Fifth Streets adjacent to the Project Area (see Architectural Resources, p. VI.I.5).

Alternative B. Views from Townsend and Third Streets would include seven-story medium-high density residential buildings over one level of parking replacing the RV park and railroad tracks (see Figure VI.I.6, p. VI.I.38). Those buildings, with their associated open space, would occupy the blocks along Townsend Street from Third Street to Seventh Street. Open space is assumed to be on the south (King Street) side of the block for sun exposure, and over the parking structure. First-floor uses along Third and Townsend Streets are assumed to be parking, building entrances, exits and structural walls.

The new buildings would obscure the view of Potrero Hill and the China Basin Building to the south. The ridge of Twin Peaks would remain visible down Townsend Street. As with Alternative A, sidewalks would be narrow with parking (not shown) on the street side and the blank walls of parking structures on the south side. The new buildings would contrast in scale, bulk and facade materials with those of the older masonry or brick, often ornamented, buildings fronting the north side of Townsend Street between Second and Fifth Streets (see p. VI.I.6).

Alternative N. With new office and parking uses between Third and Fourth Streets, Alternative N would appear similar to Alternative A on the block (see Figure VI.I.6, p. VI.I.39). In Alternative N, the blocks along Townsend Street from Fourth Street through Seventh Street would include the Caltrain commute terminal and railroad tracks and would appear similar to existing conditions.

The new buildings would obscure the existing view of Potrero Hill and the China Basin Building, except for the view down Townsend Street and over the existing railroad tracks. Pedestrian conditions would be similar to these described for Alternative A. Sidewalks on the south side of Townsend near the railroad track west of Fourth Street might remain in their current poor condition. The new buildings on the Third and Townsend block would contrast in scale, bulk and facade materials with those of the older masonry or brick, often ornamented, buildings fronting the north side of Townsend Street between Second and Fifth Streets.

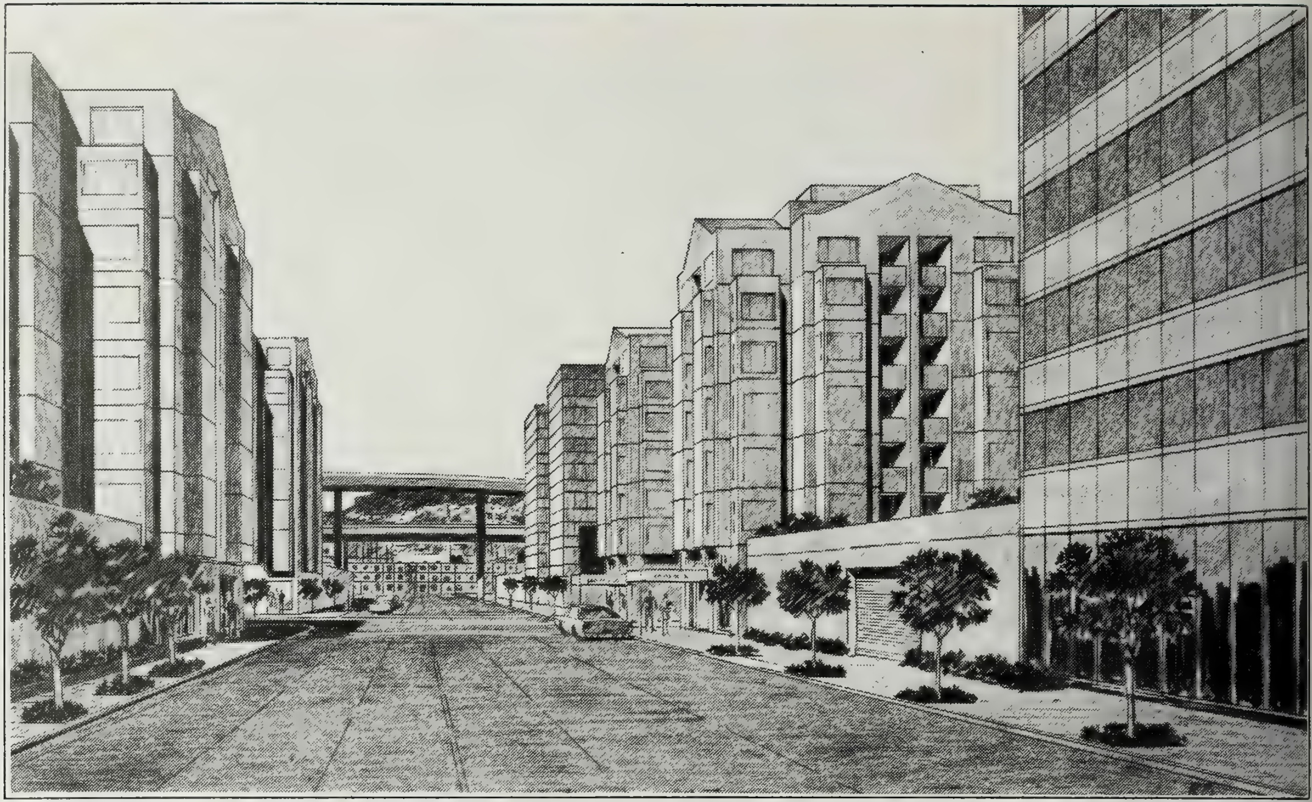
Viewpoint 2 - Berry Street Near Fourth Street

Alternative A. Figure VI.I.7, illustrates the view west on Berry Street near Fourth Street with the I-280 stub demolished and replaced with office and HDR buildings. Removal of the freeway would provide more sky exposure on Berry Street and eliminate views of supporting piers and overhead roadway. The office buildings on the north side of Berry Street would have the same general characteristics as the office buildings described in Figure VI.I.6, Viewpoint 1, Alternative A. The MHDR buildings near Berry and Fifth would range up to seven stories. HDR building south of Berry would be up to eight stories.

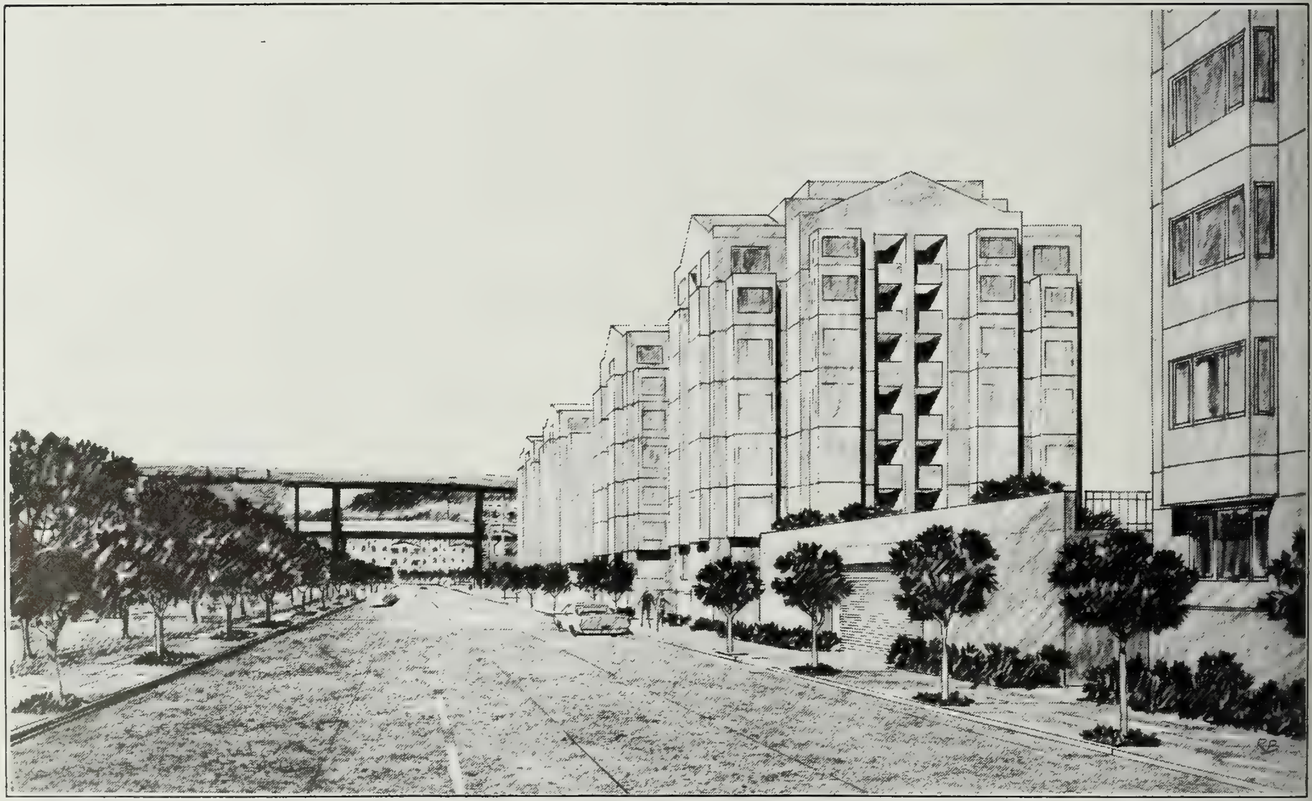
The new buildings would obscure existing views to the south and west of Potrero Hill and Twin Peaks, except for limited views down Berry Street itself and between new buildings. The Sixth Street freeway ramps would be visible beyond the new buildings, over Berry Street. Three-story S/LI/RD buildings would appear beyond the freeway near Seventh Street. The new sidewalks along Berry Street would be landscaped and relatively wide, with parking and ground-floor conditions as described for the Third and Townsend Streets viewpoint i.e., areas of blank walls, separating building entrances.

Alternative B. Berry Street with Alternative B would include medium-high density residential buildings on the north (see Figure VI.I.7). As with Alternative A, views and shading of the freeway structure over Berry Street would be eliminated. The south side would be open space extending to China Basin Channel. West of Sixth Street would be additional residential buildings which would partially block the view down Berry Street under the Sixth Street freeway ramps. The open space proposed south of Berry Street would enhance pedestrian views to the south toward Potrero Hill and the channel, and increase sunlight access to open space and residential courtyards of buildings to the north.

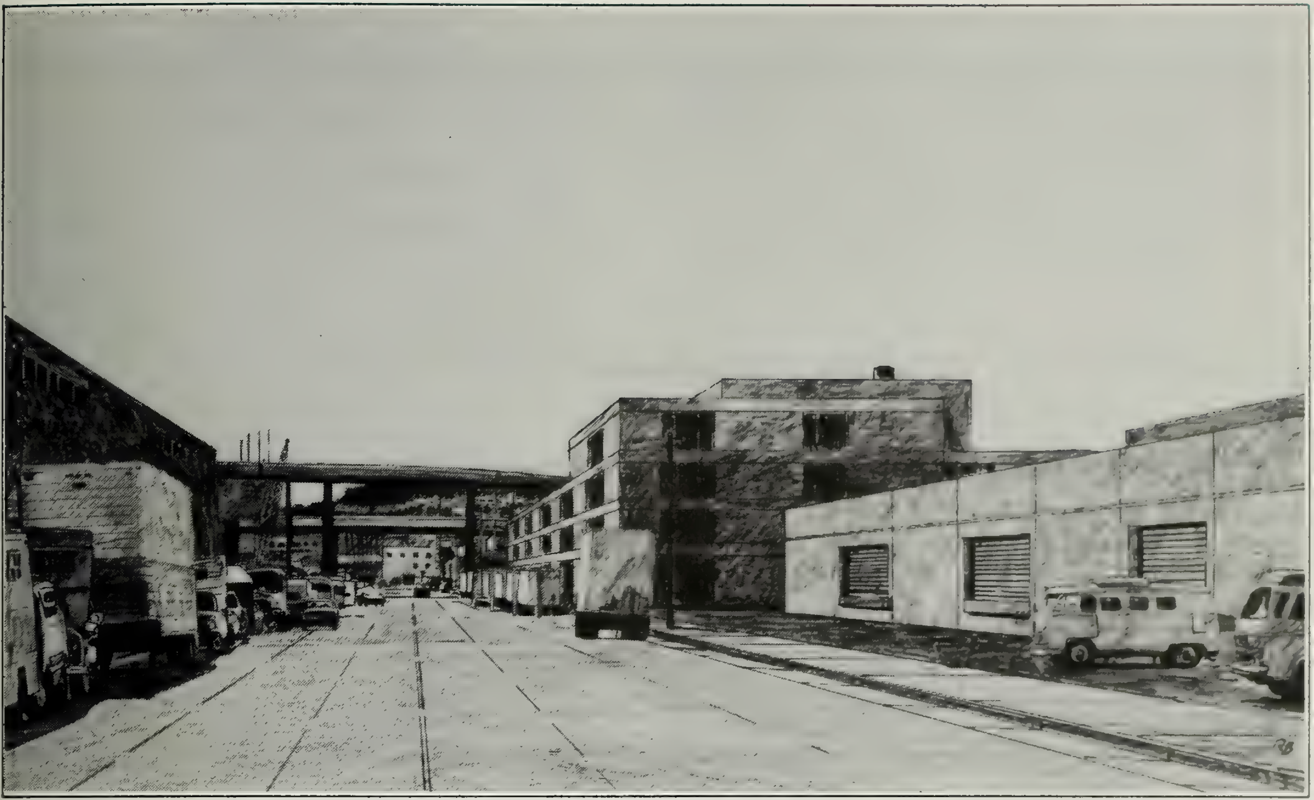
Alternative N. Berry Street, as defined in Alternative N, would include views of industrial buildings (see Figure VI.I.7). The uses could be served by railroad



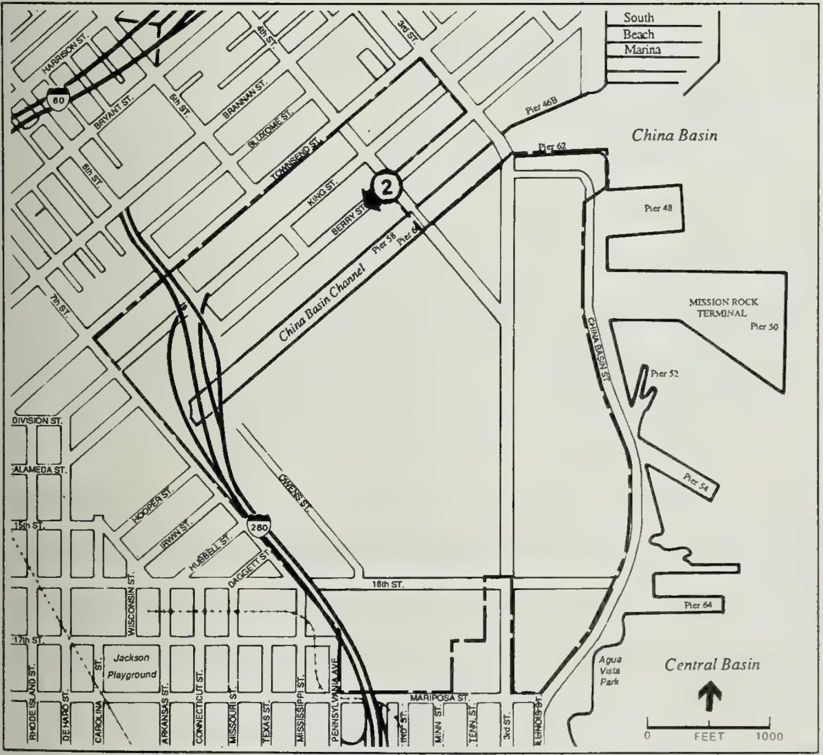
ALTERNATIVE A: Berry Street near Fourth Street (Viewpoint 2)



ALTERNATIVE B: Berry Street near Fourth Street (Viewpoint 2)



ALTERNATIVE N: Berry Street near Fourth Street (Viewpoint 2)


South
Beach
Marina
China Basin
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
2
6th ST.
7th ST.
Pier 46B
Pier 62
Pier 48
Pier 58
Pier 64
China Basin Channel
MISSION ROCK
TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
CHINA BASIN ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
17th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
280
18th ST.
WISCONSIN ST.
Jackson
Playground
MARIPOSA ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA
ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
Agua
Vista
Park
Central Basin
0
FEET
1000

NOTE: The illustrations are building mass and view studies that incorporate conservative height and bulk assumptions to present a reasonable worst-case scenario of street-level views. The illustrations are not renderings of specific building designs, and do not represent the pedestrian or vehicular activity that may occur in the viewpoints.

Mission Bay

FIGURE VI.I.7
ILLUSTRATION OF ALTERNATIVES -
VIEWPOINT 2: BERRY STREET NEAR FOURTH STREET

OURCE: Roger Owen Boyer and Associates

tracks. As discussed for Alternatives A and B, the freeway structure would be removed. The new buildings would obscure most of the existing view of Potrero Hill and Twin Peaks now visible beyond the Sixth Street freeway ramps. Views down Berry Street itself and between new buildings would remain. New sidewalks on Berry Street would be expected to have few pedestrian amenities and little landscaping, similar to other industrial areas.

Viewpoint 3 - China Basin Channel Near Fourth Street

Alternative A. Views westerly along China Basin Channel near Fourth Street would include eight-story residential buildings, replacing the I-280 stub, north of the channel with retail uses and terraces fronting on landscaped open space (see Figure VI.I.8, p. VI.I.47) The channel edge would be lined with intermittent wood decks built over the water. Other parts of the shoreline would be landscaped gabions (rock fill) or T-walls (visible as vertical concrete walls) to retain the bank. Those improvements would replace views of the existing concrete rubble, rock and mud shoreline of the channel.

Visible at the westerly end of the channel would be the existing houseboat community and Sixth Street ramps of I-280. South of the channel would be open space, extending continuously from the Bay to the railroad tracks between Owens and Seventh Streets. South of the open space, not visible in Figure VI.I.8, would be six-story and eight-story MDR and MHDR buildings.

Residential buildings north of the channel would obscure the view of Twin Peaks and Sutro Tower. Potrero Hill would remain partially visible beyond the existing Sixth Street freeway ramps. With the I-280 stub removed, open space on both sides of the channel would provide an enhanced pedestrian environment.

Alternative B. Views along the north side of the channel near Fourth Street would include major open space south of Berry Street on land available after demolition of the I-280 stub (see Figure VI.I.8, p. VI.I.47). North of Berry Street would be six- to eight-story residential buildings. The channel shoreline open space would be developed with pathways and landscaping. The existing houseboat community and the Sixth Street ramp would remain visible. South of the channel would be open space with a new wetlands, providing views of a curvilinear shoreline of marsh grass, with mudflats at low tide. South of Hooper Street would be additional open space and residential buildings.

New buildings north of Berry Street would obscure the existing partial view of Twin Peaks. Only the upper portion of Sutro Tower would remain visible, as would Potrero Hill beyond the Sixth Street freeway ramps. The open space in Alternative B would provide an enhanced pedestrian environment near the channel and south of Hooper.

Alternative N. Views along China Basin Channel with Alternative N would generally include industrial buildings (see Figure VI.I.8). After demolition of the I-280 freeway stub, the area north of the channel would be developed with two- to four-story industrial uses. The existing houseboat community and the Sixth Street ramps would remain. Views south of the channel would also include industrial buildings.

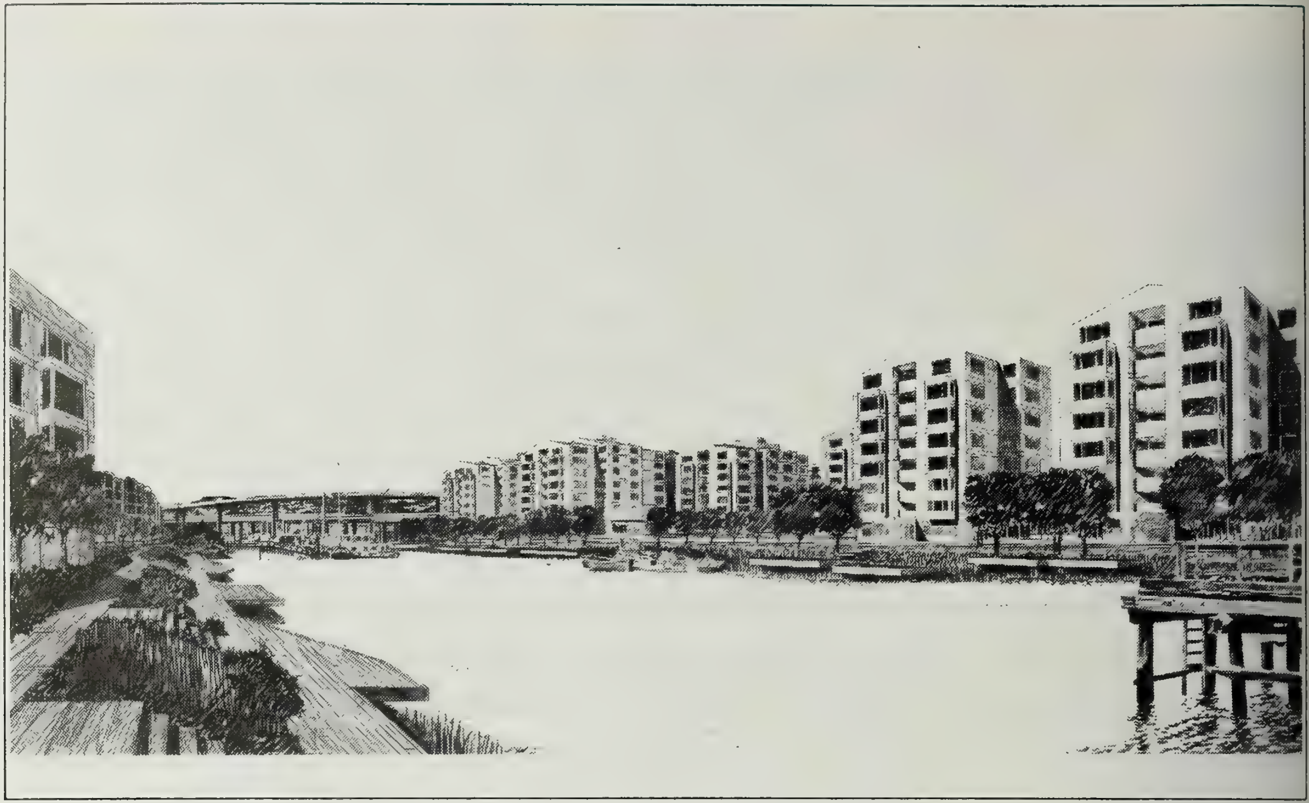
The new buildings and uses would obscure the existing view of Twin Peaks; the upper portion of Sutro Tower and Potrero Hill would remain partially visible beyond the Sixth Street ramps. New open space about 25 feet wide would be provided on each side of the channel with pathways along the water; channel embankments would be similar to existing conditions. Because of industrial uses, the pedestrian areas along the channel would have few amenities.

Viewpoint 4 - Third, Fourth and Mission Rock Streets

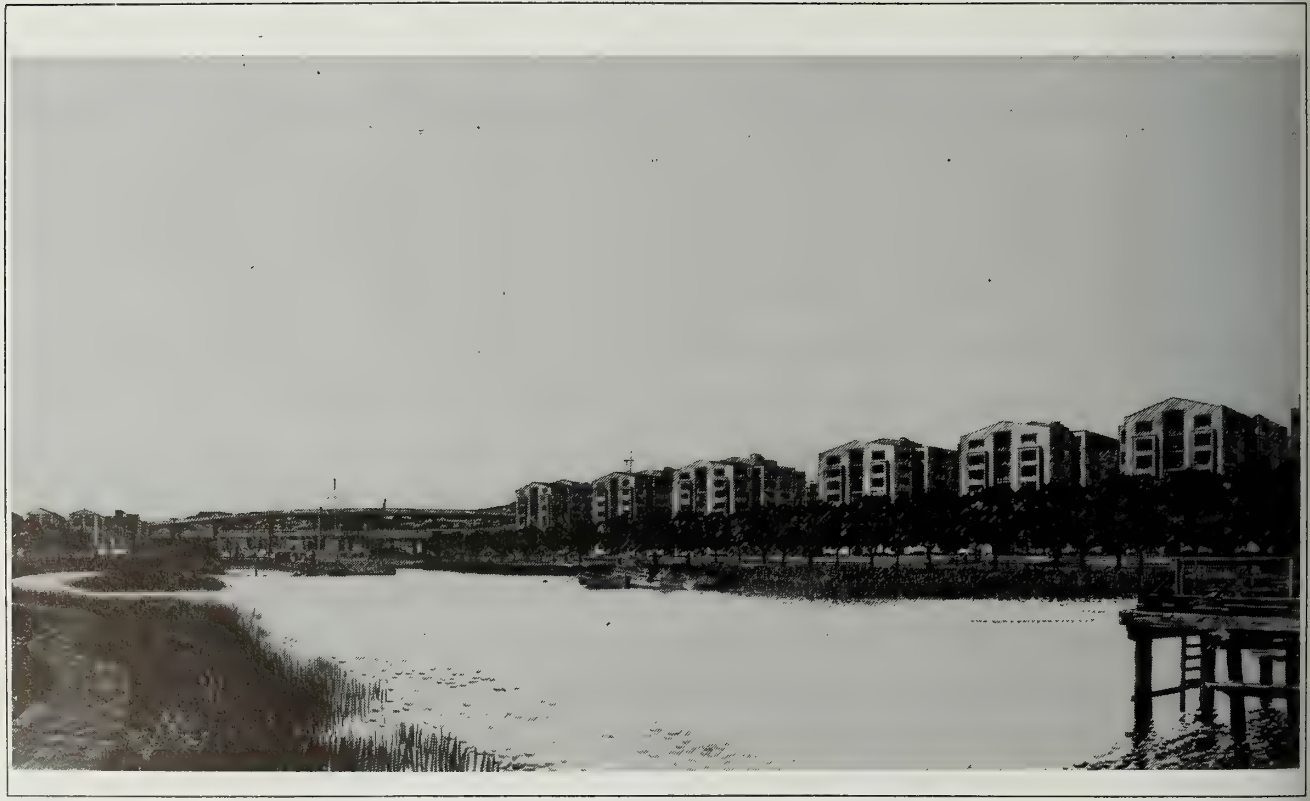
Alternative A. Views north on Third and Fourth Streets with Alternative A would include an eight-story hotel, six-story residential buildings west of Third Street and a six-story community facility with open space east of Third Street (see Figure VI.I.9, p. VI.I.48). The hotel would be oriented to allow upper floor rooms to have views of the Bay and downtown San Francisco. The hotel site would include street-level features such as entrance areas and retail uses. At-grade parking would be visible from the street.

From this viewpoint, new buildings would obscure most of the existing views of the China Basin Building and downtown San Francisco; the two drawbridges would remain visible. Pedestrian streetscape conditions would include widened sidewalks and landscaping. Third Street would have hotel activity and retail shops on the west side and open space with views to the Bay on the east. The eight-story hotel would have a horizontal orientation, similar to the height and orientation of the China Basin Building and would be larger in scale than nearby residential buildings.

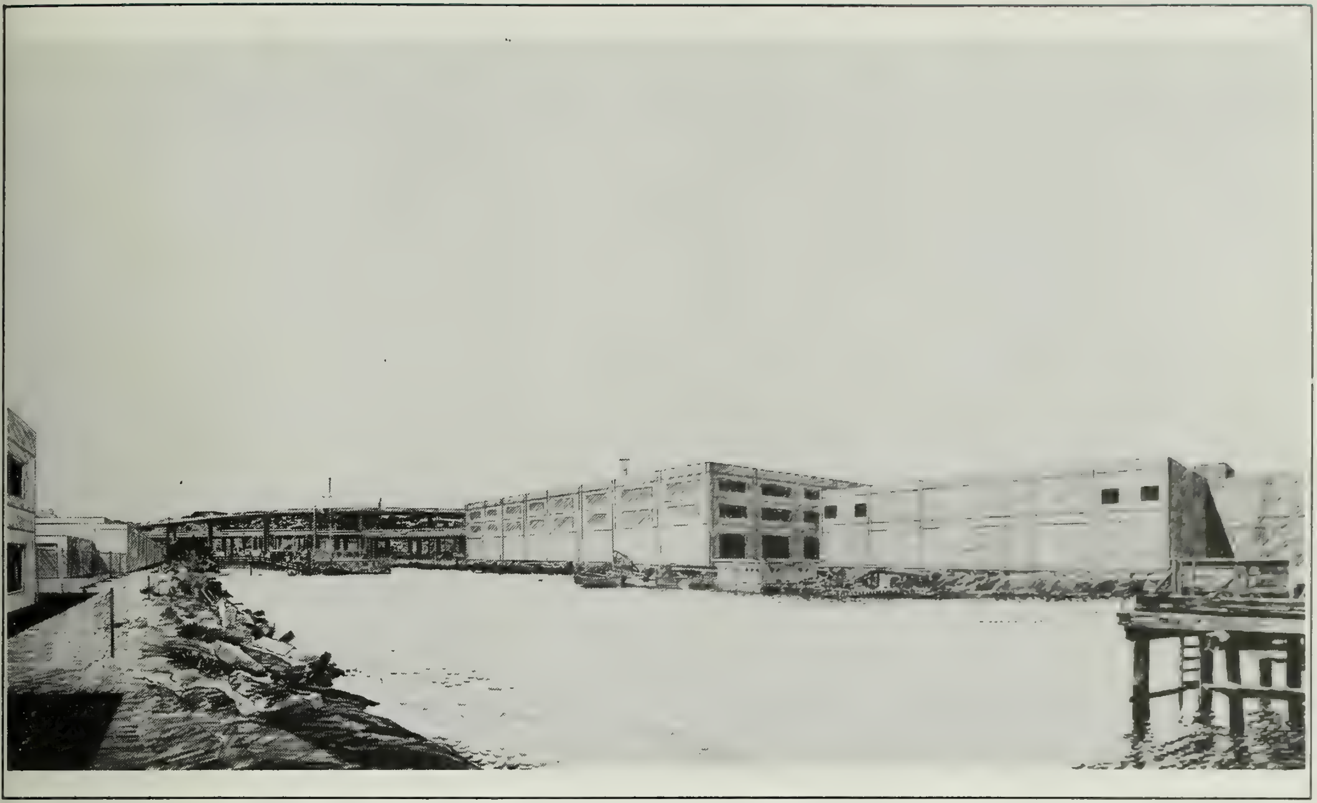
Alternative B. With Alternative B, views north on Third and Fourth Streets from open space between Third and Fourth Streets would include the downtown skyline and the China



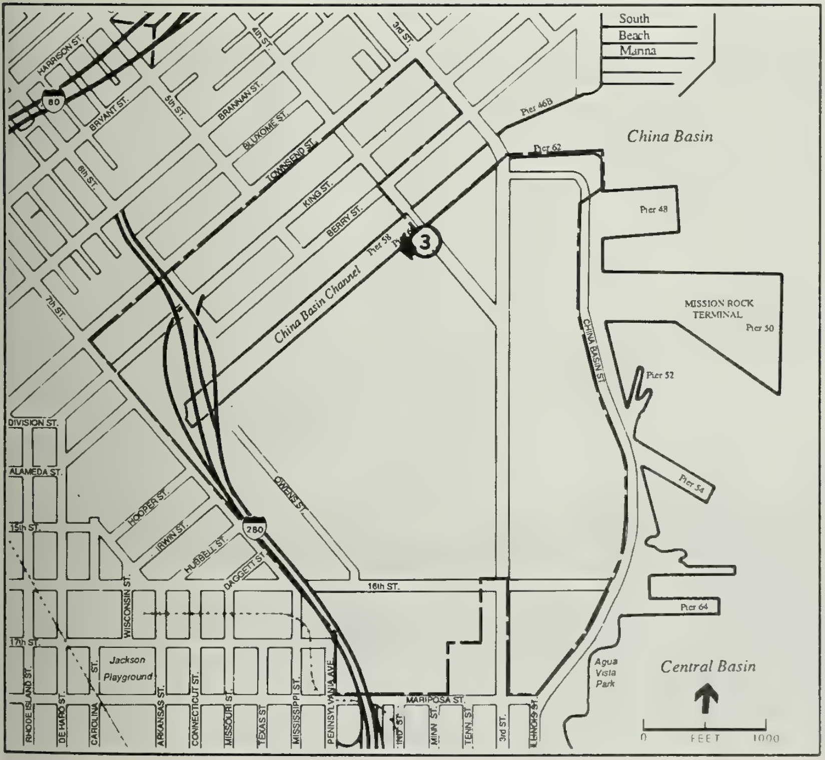
ALTERNATIVE A: China Basin Channel near Fourth Street (Viewpoint 3)



ALTERNATIVE B: China Basin Channel near Fourth Street (Viewpoint 3)



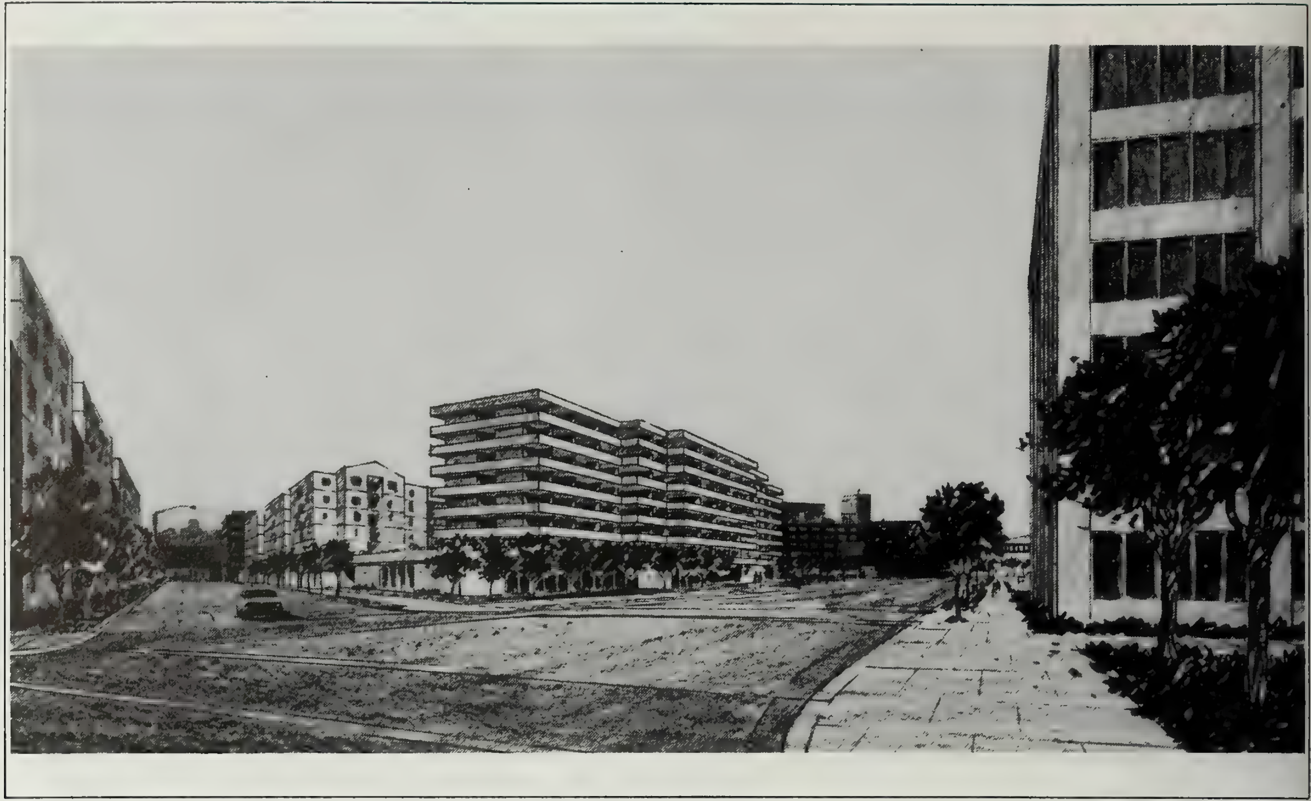
ALTERNATIVE N: China Basin Channel near Fourth Street (Viewpoint 3)


South
Beach
Marina
China Basin
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
Pier 46B
Pier 62
Pier 48
Pier 58
3
China Basin Channel
MISSION ROCK
TERMINAL
Pier 50
CHINA BASIN ST.
Pier 52
Pier 54
Pier 64
DIVISION ST.
ALAMEDA ST.
15th ST.
16th ST.
17th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
280
WISCONSIN ST.
Jackson
Playground
MARIPOSA ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
Agua
Vista
Park
Central Basin
0
FEET
1000

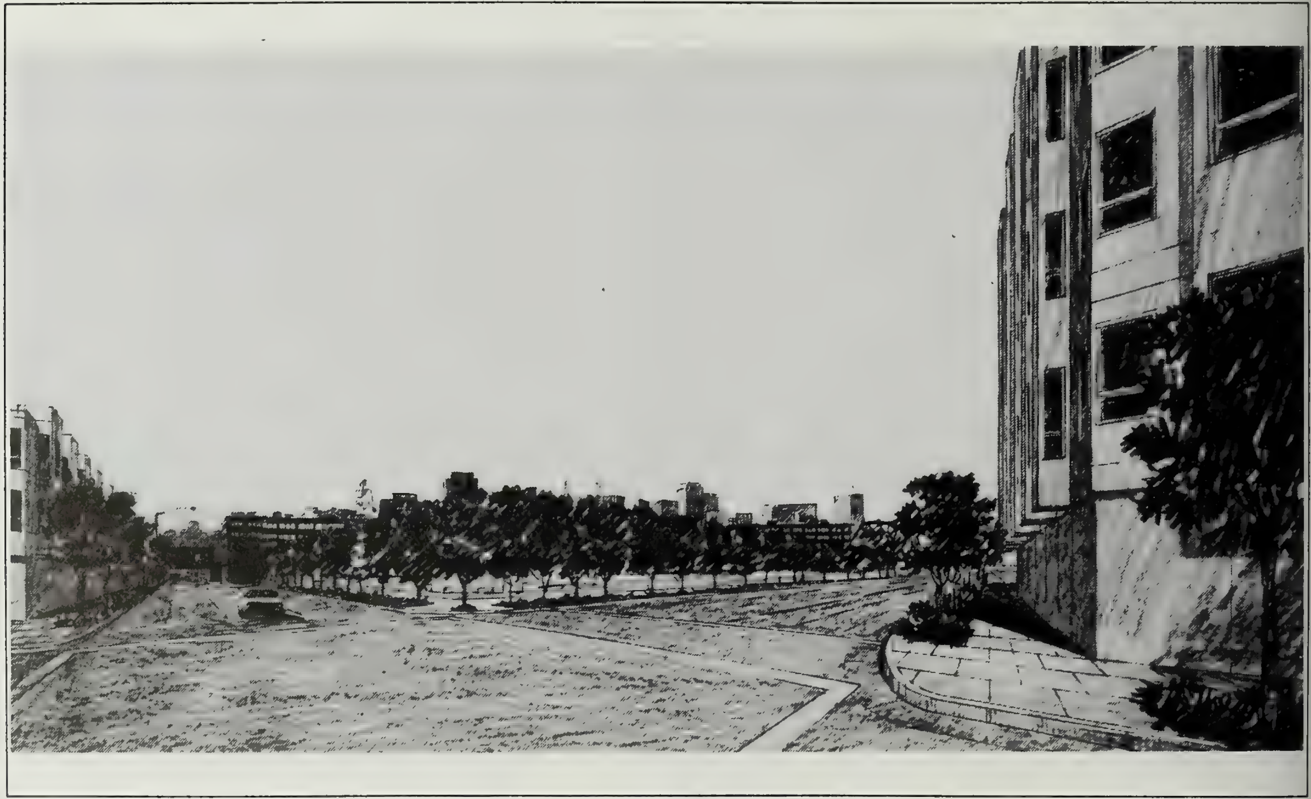
NOTE: The illustrations are building mass and view studies that incorporate conservative height and bulk assumptions to present a reasonable worst-case scenario of street-level views. The illustrations are not renderings of specific building designs, and do not represent the pedestrian or vehicular activity that may occur in the viewpoints.

FIGURE VI.I.8
ILLUSTRATION OF ALTERNATIVES -
VIEWPOINT 3: CHINA BASIN CHANNEL NEAR FOURTH STREET

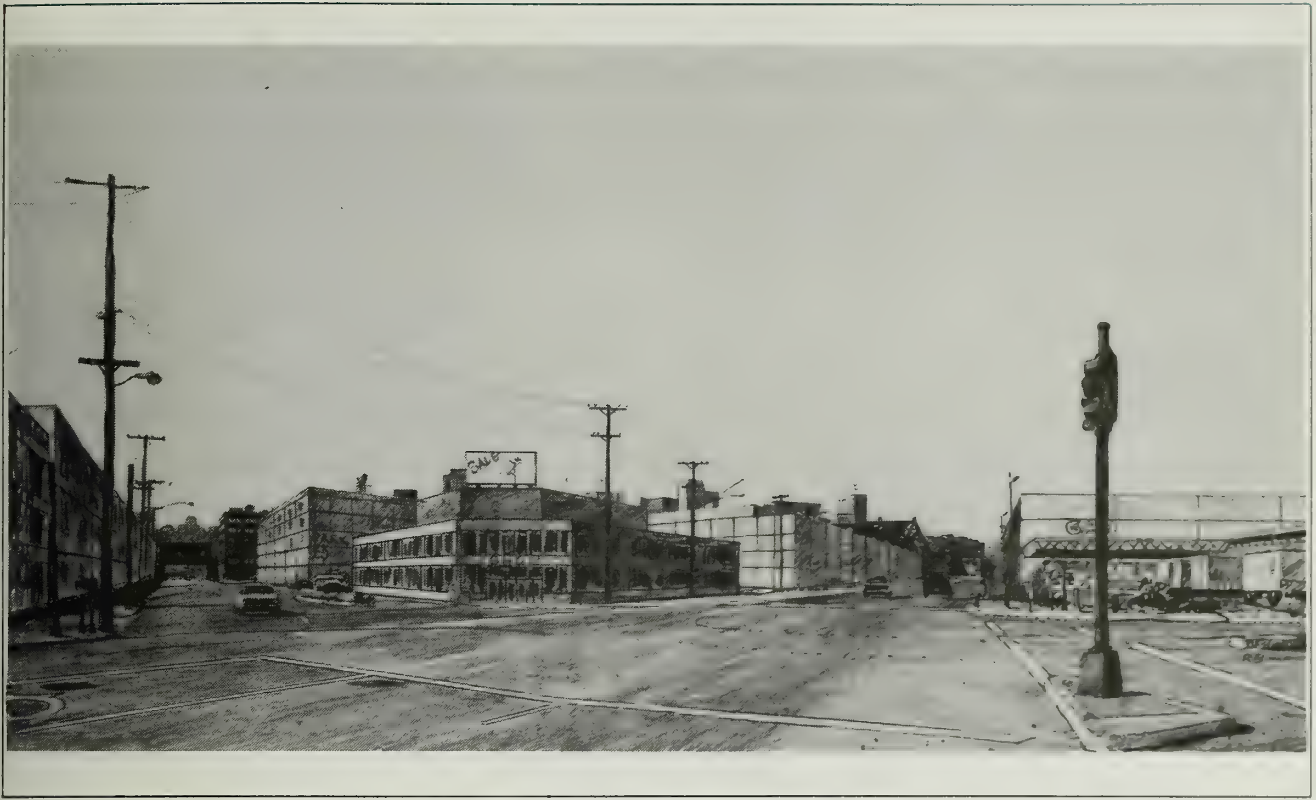
URCE: Roger Owen Boyer and Associates



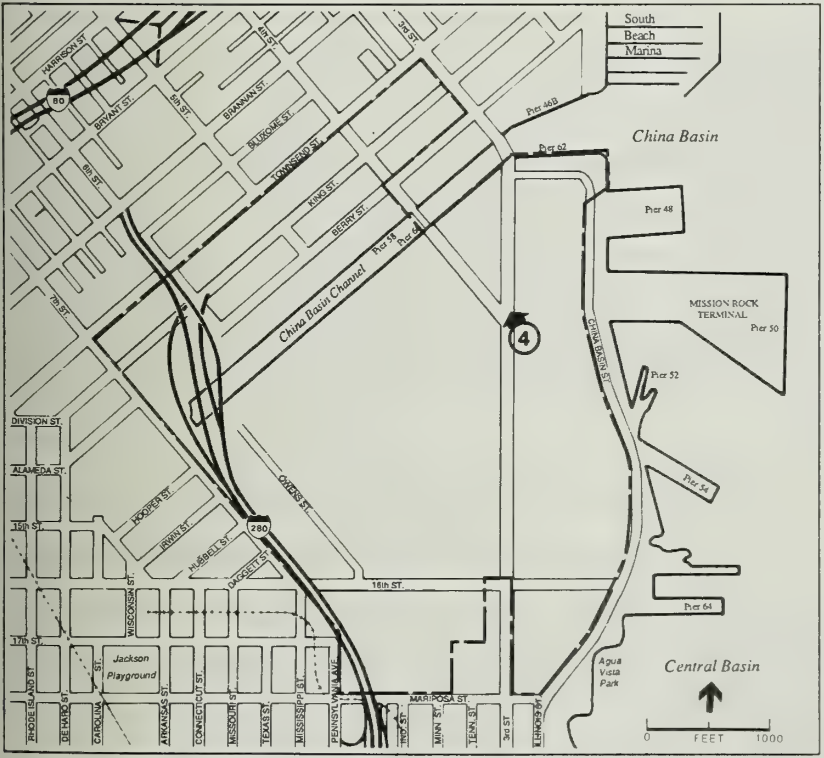
ALTERNATIVE A: Third, Fourth and Mission Rock Streets (Viewpoint 4)



ALTERNATIVE B: Third, Fourth and Mission Rock Streets (Viewpoint 4)



ALTERNATIVE N: Third, Fourth and Mission Rock Streets (Viewpoint 4)


South
Beach
Marina
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
Pier 46B
Pier 62
China Basin
Pier 48
Pier 58
Pier 60
China Basin Channel
MISSION ROCK
TERMINAL
Pier 50
4
CHINA BASIN ST.
Pier 52
Pier 54
DIVISION ST.
ALAMEDA ST.
15th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
280
16th ST.
Pier 64
17th ST.
WISCONSIN ST.
Jackson
Playground
MARIPOSA ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
Agua
Vista
Park
Central Basin
0
FEET
1000

NOTE: The illustrations are building mass and view studies that incorporate conservative height and bulk assumptions to present a reasonable worst-case scenario of street-level views. The illustrations are not renderings of specific building designs, and do not represent the pedestrian or vehicular activity that may occur in the viewpoints.

FIGURE VI.I.9
ILLUSTRATION OF ALTERNATIVES -
VIEWPOINT 4: THIRD, FOURTH AND MISSION ROCK STREETS

OURCE: Roger Owen Boyer and Associates

Basin Building (see Figure VI.I.9, p. VI.I.48). West of Fourth Street would be three- to four-story, low-density residential buildings. East of Third Street would be medium-density residential uses, up to six stories, and open space. The open space which would include new wetlands east of Third Street would provide views of parks, the Bay and downtown.

Alternative N. The view north from Third and Fourth Streets with Alternative N would have a two-story retail building on the Banana Triangle area, and retail uses with surface parking and loading docks north of the building (see Figure VI.I.9, p. VI.I.49). To the west would be one- and two-story tilt-up concrete buildings for warehouse and light industrial uses. East of Third Street would include new infill buildings among existing industrial buildings.

The new buildings and uses would obscure most of the existing view of downtown San Francisco and the China Basin Building. The views down Third and Fourth Streets to the drawbridges would remain. Sidewalks would be expected to have minimal pedestrian amenities with little or no landscaping.

Viewpoint 5 - Former Southern Pacific Railyards

Alternative A. Views northerly along extended Minnesota Street from the proposed Central Square would include the center of a neighborhood of four- to five-story residential buildings with street-level retail uses (see Figure VI.I.10, p. VI.I.52). The new buildings would reduce, but not eliminate, the existing view of downtown San Francisco and the China Basin Building. The two-acre plaza and adjacent retail uses would provide a pedestrian-oriented streetscape.

Alternative B. The northerly view from Hubbell Street would be between two residential buildings separated by 125-foot-wide open space corridor, part of a continuous open space system from the Bay to China Basin Channel in Alternative B (see Figure VI.I.10, p. VI.I.52). LDR and MDR would bound the major open space south of the channel. MHDR uses would be visible north of the channel. Views of downtown San Francisco and the China Basin Building would remain, depending on placement of landscaping in the open space.

Alternative N. Views northerly along a secondary street would include industrial buildings two- to four-stories high (see Figure VI.I.10, p.VI.I.53). The buildings would reduce the existing view of downtown San Francisco and China Basin Building. The downtown skyline would be visible above the industrial buildings. Because of the industrial uses with this Alternative, the pedestrian areas along this street would have few amenities and little landscaping.

Viewpoint 6 – Owens Street North of 16th Street

Alternative A. The view north on Owens Street would be of two- to four-story S/LI/RD buildings to the west and six- to eight-story MHDR buildings to the east (see Figure VI.I.11, p. VI.I.54). From street level, new buildings would obscure views of I-280 and downtown San Francisco except for views down Owens Street itself. Both sides of Owens would include street landscaping.

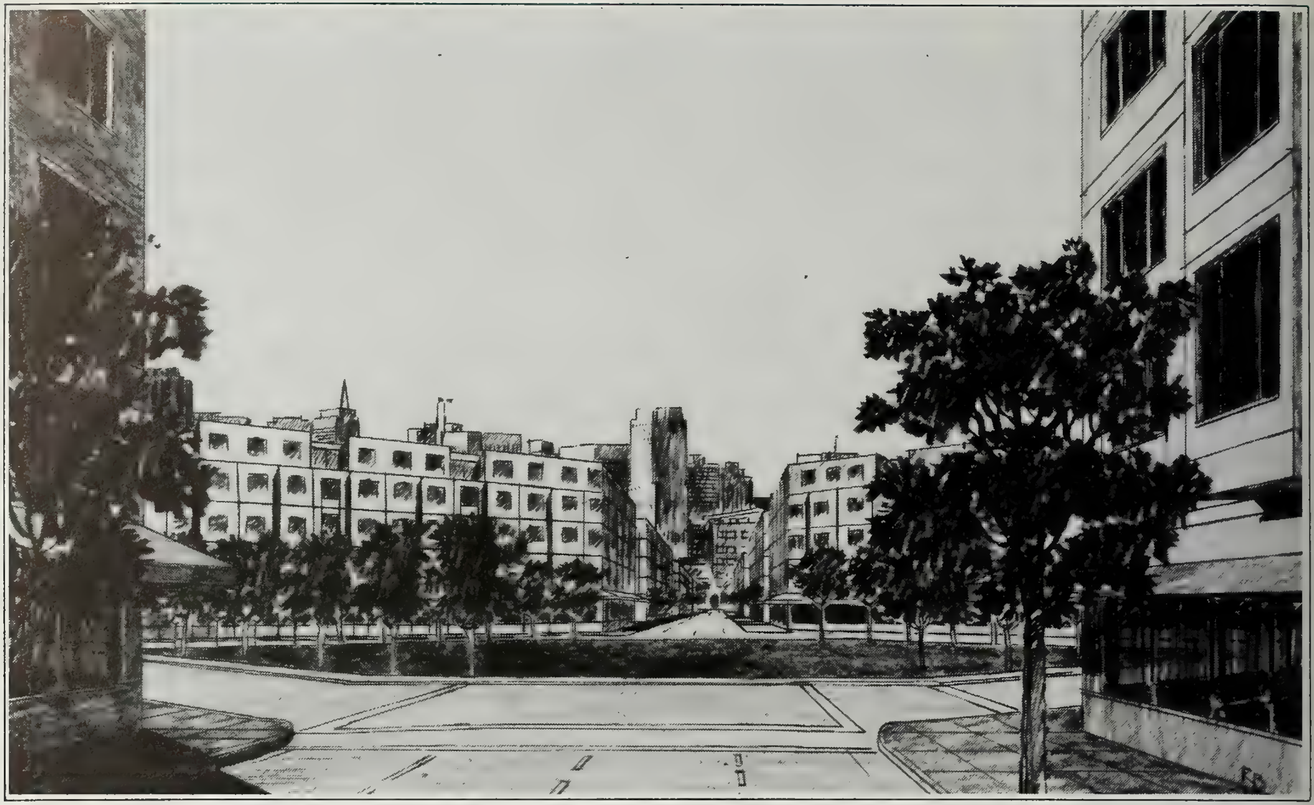
Alternative B. The view north on Owens Street would include six- to eight-story office buildings to the west and six-story MDR buildings to the east (see Figure VI.I.11, p. VI.I.54). From this viewpoint, new buildings would obscure views of I-280 and downtown San Francisco except for the view north on Owens Street itself. Both sidewalks would include trees and landscaping.

Alternative N. Views north on Owens Street would include one- to four-story industrial buildings on the west and east, for warehouse and light industrial uses (see Figure VI.I.11, p. VI.I.55). The existing warehouse on the east side would probably remain. Further north would be other industrial buildings. New buildings would obscure most of the existing views of downtown San Francisco and I-280. Pedestrian amenities would be expected to be minimal, with conditions similar to those in other industrial areas.

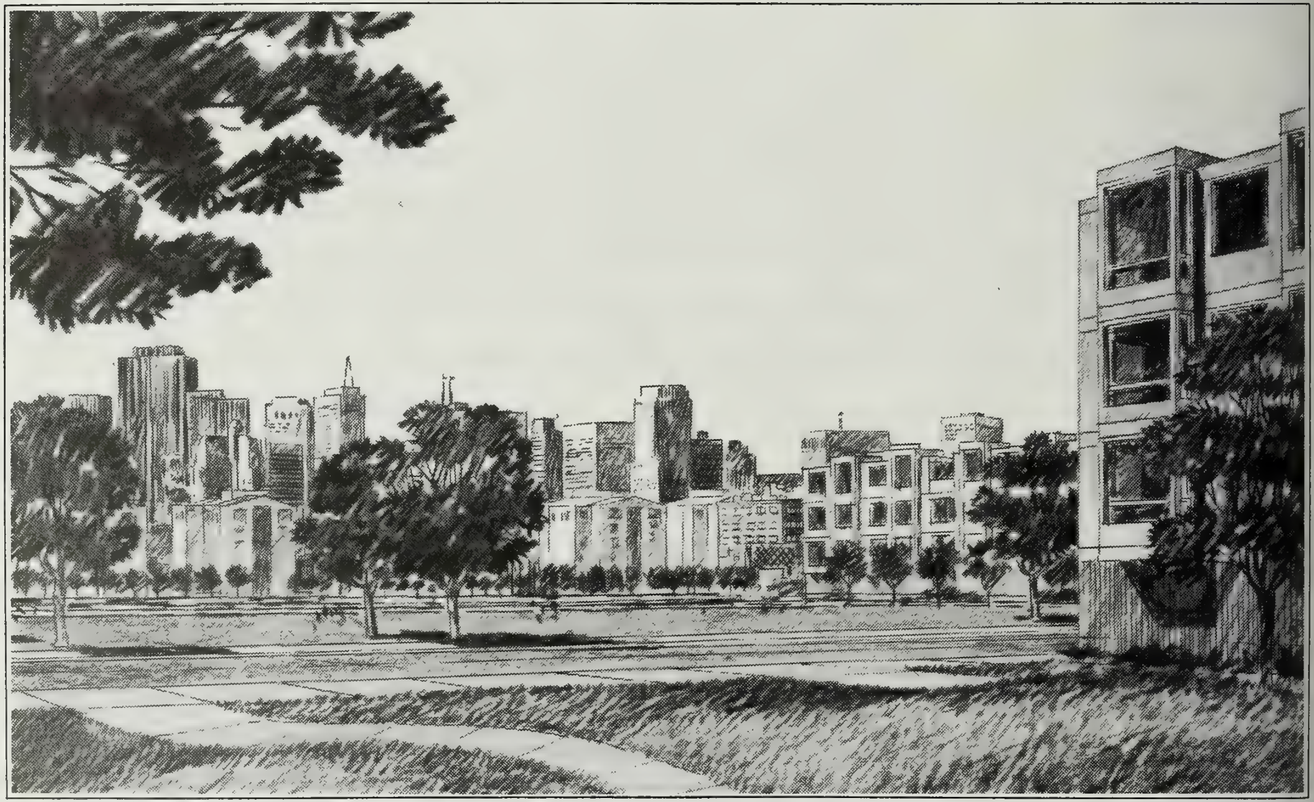
SHADOW

Build-Out/2020

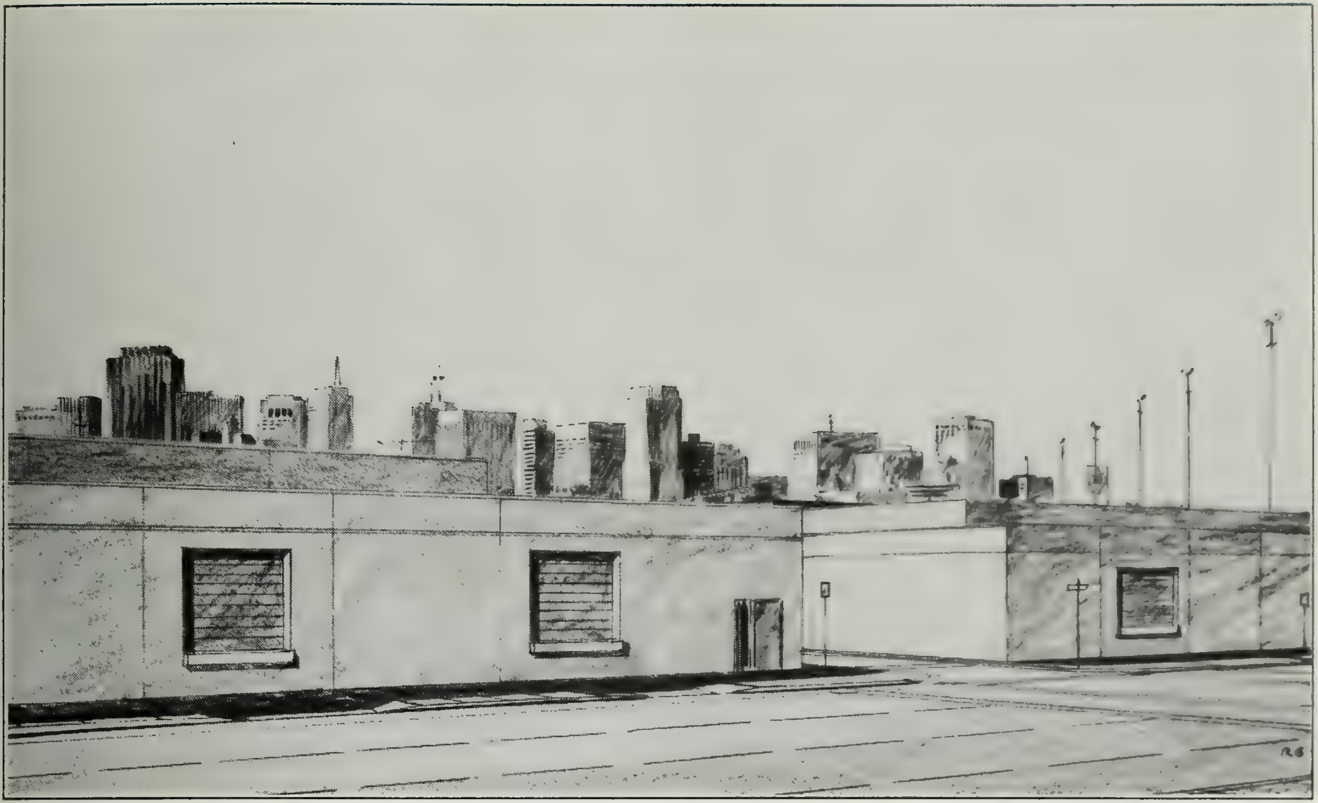
New buildings in Mission Bay could potentially shade public open space proposed under each Alternative. The extent and duration of shadows cast would depend on the actual design, height, bulk, and lot placement and coverage of each specific structure. Because such detail is not available now, generalized building massings for each land use were used to estimate the maximum shading potential for various land uses. The analysis is necessarily general in nature, but presents an order-of-magnitude estimate of the worst-case shadow impacts; actual shadow effects would be expected to be less than



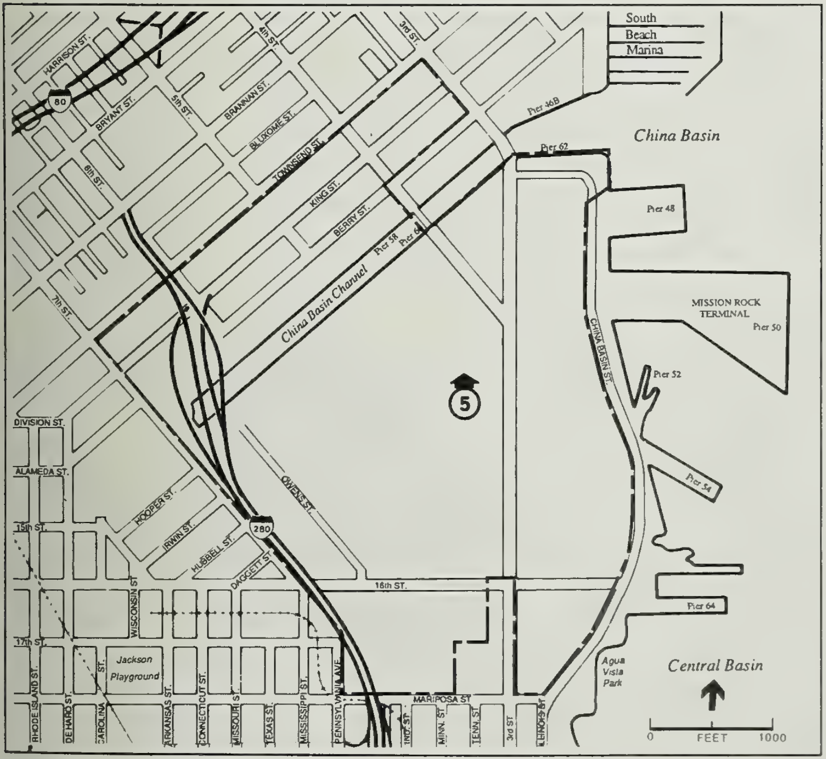
ALTERNATIVE A: Former Southern Pacific Railyards (Viewpoint 5)



ALTERNATIVE B: Former Southern Pacific Railyards (Viewpoint 5)



ALTERNATIVE N: Former Southern Pacific Railyards (Viewpoint 5)

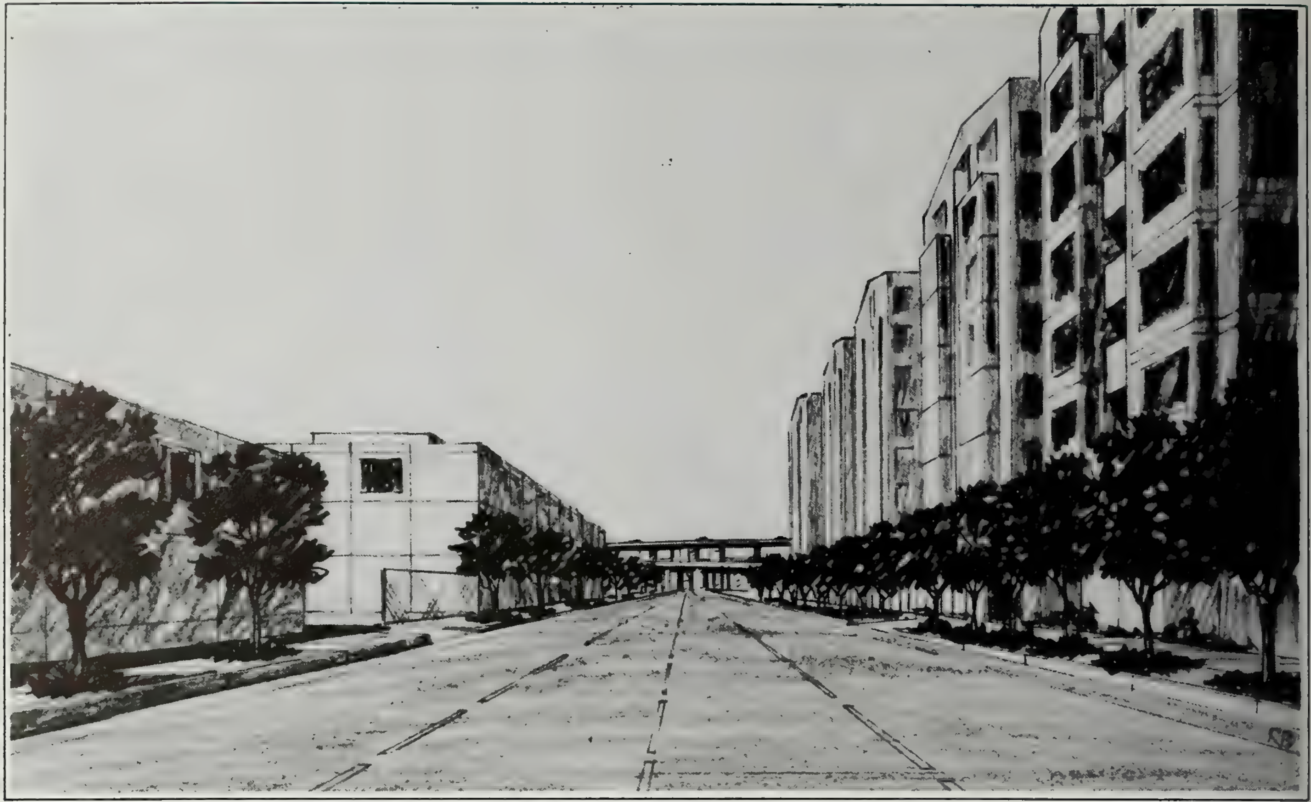

South
Beach
Marina
China Basin
Pier 46B
Pier 62
Pier 48
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
Central Basin
Agua Vista Park
HARRISON ST.
80
BRYANT ST.
5th ST.
4th ST.
3rd ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
6th ST.
7th ST.
China Basin Channel
Pier 58
Pier 60
CHINA BASIN ST.
5
DIVISION ST.
ALAMEDA ST.
15th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
280
16th ST.
17th ST.
WISCONSIN ST.
Jackson Playground
MARIPOSA ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
0
FEET
1000

NOTE: The illustrations are building mass and view studies that incorporate conservative height and bulk assumptions to present a reasonable worst-case scenario of street-level views. The illustrations are not renderings of specific building designs, and do not represent the pedestrian or vehicular activity that may occur in the viewpoints.

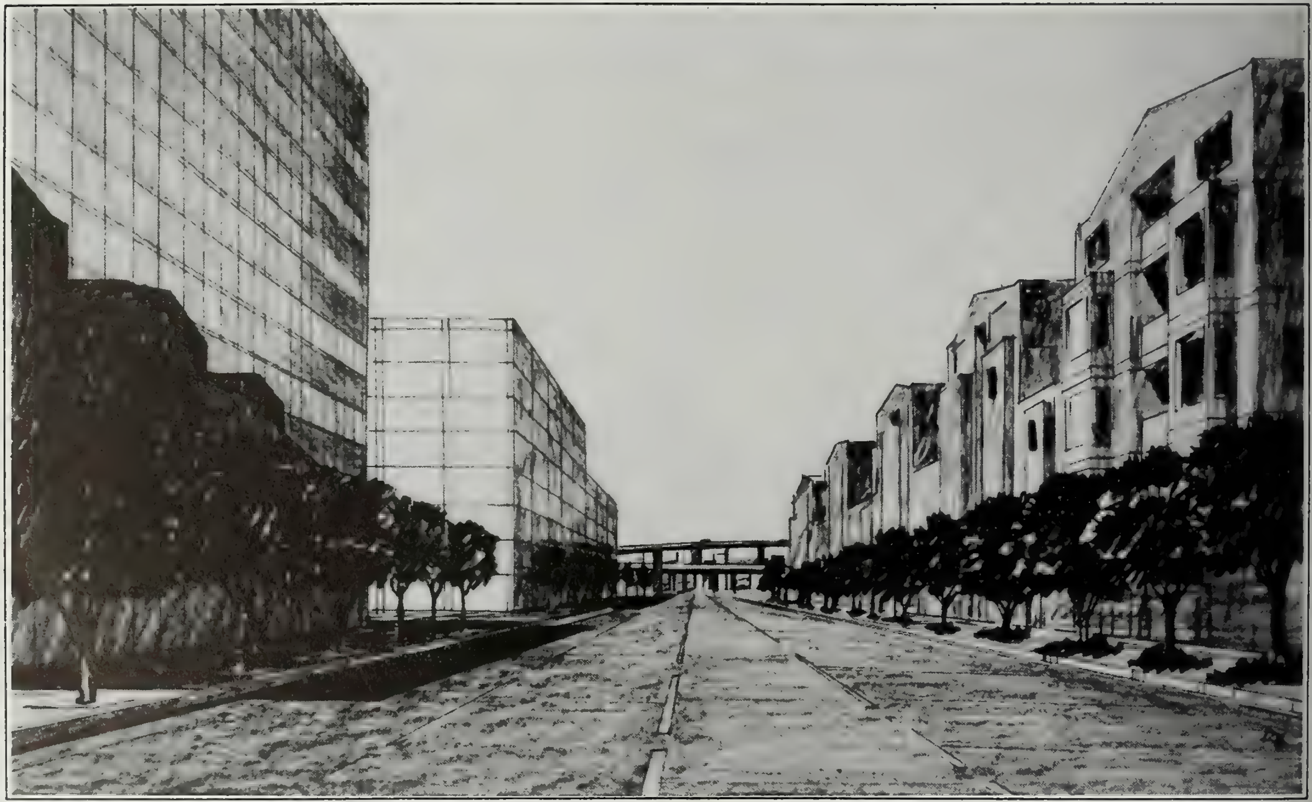
Mission Bay

OURCE: Roger Owen Boyer and Associates

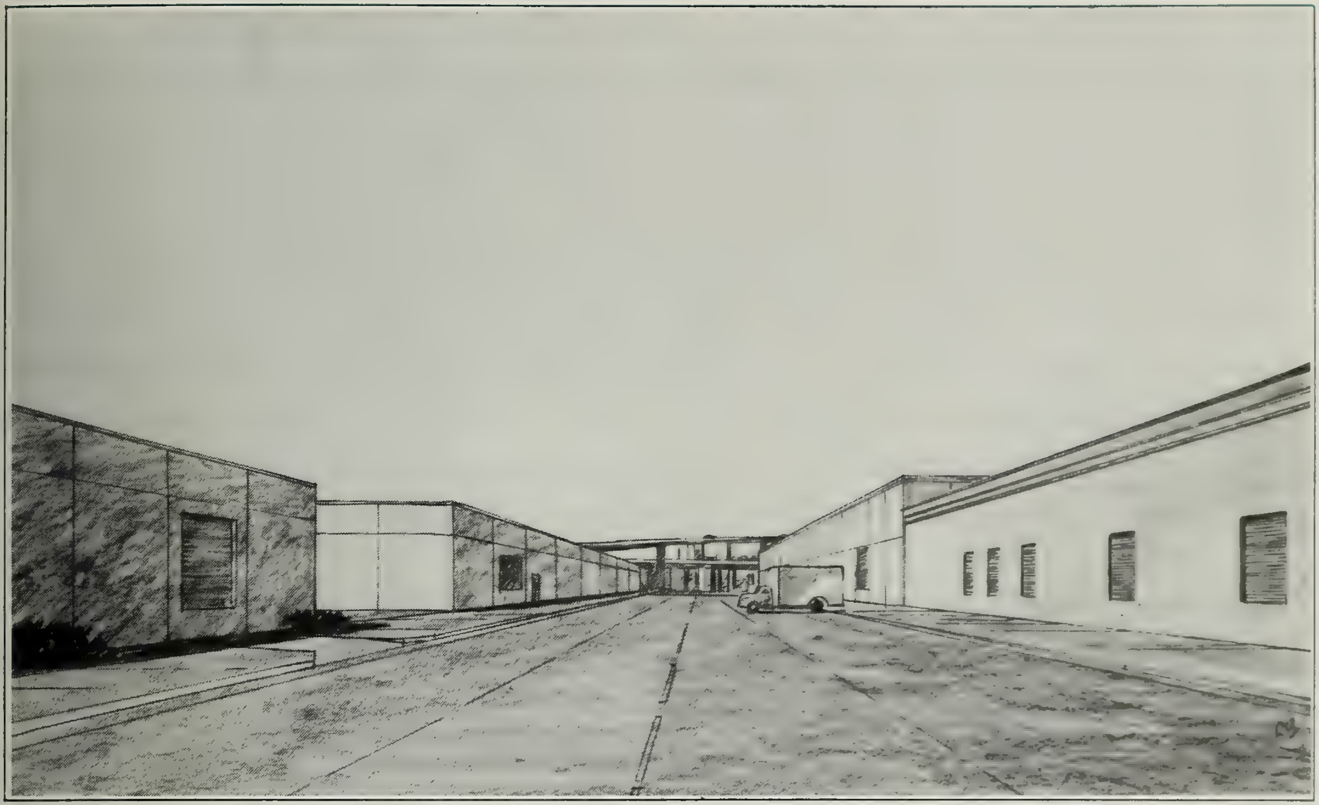
FIGURE VI.I.10
ILLUSTRATION OF ALTERNATIVES -
VIEWPOINT 5: FORMER SOUTHERN PACIFIC RAILYARDS



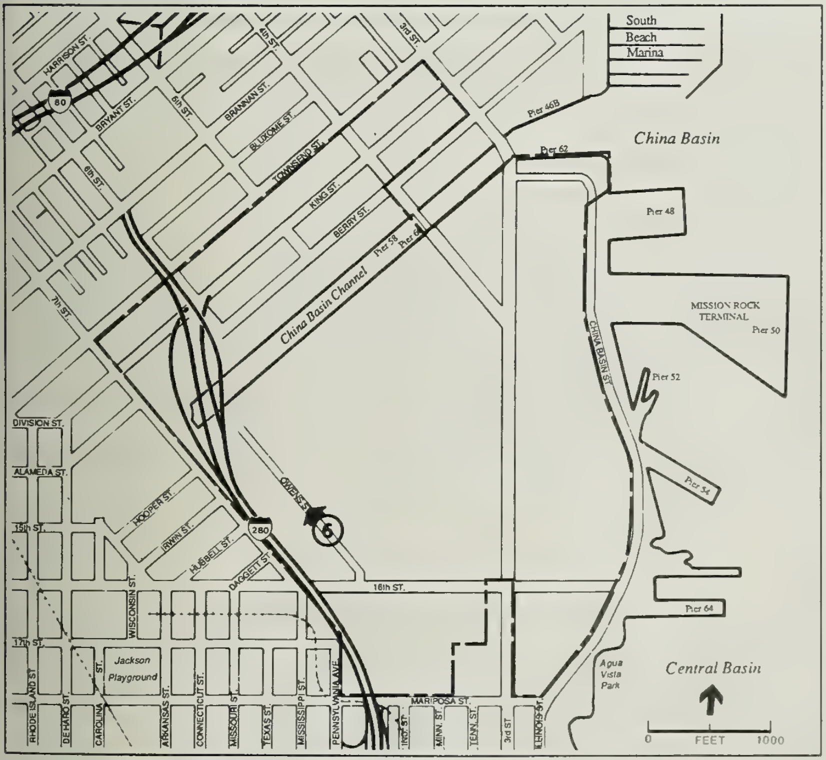
ALTERNATIVE A: Owens Street North of 16th Street (Viewpoint 6)



ALTERNATIVE B: Owens Street North of 16th Street (Viewpoint 6)



ALTERNATIVE N: Owens Street North of 16th Street (Viewpoint 6)


South
Beach
Marina
China Basin
Pier 46B
Pier 62
Pier 48
MISSION ROCK TERMINAL
Pier 50
Pier 52
Pier 54
Pier 64
China Basin Channel
CHINA BASIN ST.
OWENS ST.
6
280
80
HARRISON ST.
BRYANT ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
3rd ST.
4th ST.
5th ST.
6th ST.
7th ST.
DIVISION ST.
ALAMEDA ST.
15th ST.
16th ST.
17th ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
MARIPOSA ST.
Jackson Playground
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
IND. ST.
MINN. ST.
TENN. ST.
3rd ST.
ILLINOIS ST.
Agua Vista Park
Central Basin
0 FEET 1000

NOTE: The illustrations are building mass and view studies that incorporate conservative height and bulk assumptions to present a reasonable worst-case scenario of street-level views. The illustrations are not renderings of specific building designs, and do not represent the pedestrian or vehicular activity that may occur in the viewpoints.

FIGURE VI.I.11
ILLUSTRATION OF ALTERNATIVES - VIEWPOINT 6: OWENS STREET NORTH OF 16TH STREET

OURCE: Roger Owen Boyer and Associates

those discussed below./13/ The shadow analysis reviews Build-out/2020 conditions, when development would have greatest potential effects on open space, and development of proposed open spaces would be complete.

Shadows were examined for morning (10 a.m.), noon, and afternoon (3 p.m.) for each of four conditions: winter and summer solstices when the sun is at its lowest and highest in the sky (and shadows are then the longest and shortest, respectively) and the spring and fall equinoxes when shadows are of intermediate length. The 10 a.m. to 3 p.m. times represent periods when maximum use of open space generally would occur. Shadow coverage would be greater before 10 a.m. and after 3 p.m.

The Sunlight Ordinance (Proposition K), an initiative approved in 1984, prohibits the issuance of building permits for structures above 40 feet in height that would generate significant shadow impacts on property under the jurisdiction of, or designated to be acquired by, the Recreation and Park Commission, between one hour after sunrise and one hour before sunset at any time of year. A permit may be issued if the City Planning Commission, in consultation with the Recreation and Park Commission, determines that such shadow would have an insignificant adverse impact on the use of such property. The ordinance does not apply to new structures 40 feet or less in height, nor to structures that existed before its passage; site redevelopment that is within the building envelope dimensions of former structures would also be exempt.

Ownership of or jurisdiction over open space proposed in the Mission Bay Alternatives, and therefore the applicability of the Sunlight Ordinance, has not been determined. In light of the possibility that jurisdiction over open space in Mission Bay might be transferred to the Recreation and Park Commission, the analyses below also briefly characterize shadow effects on Project Area open space in relation to the 40-foot height criterion for each Alternative.

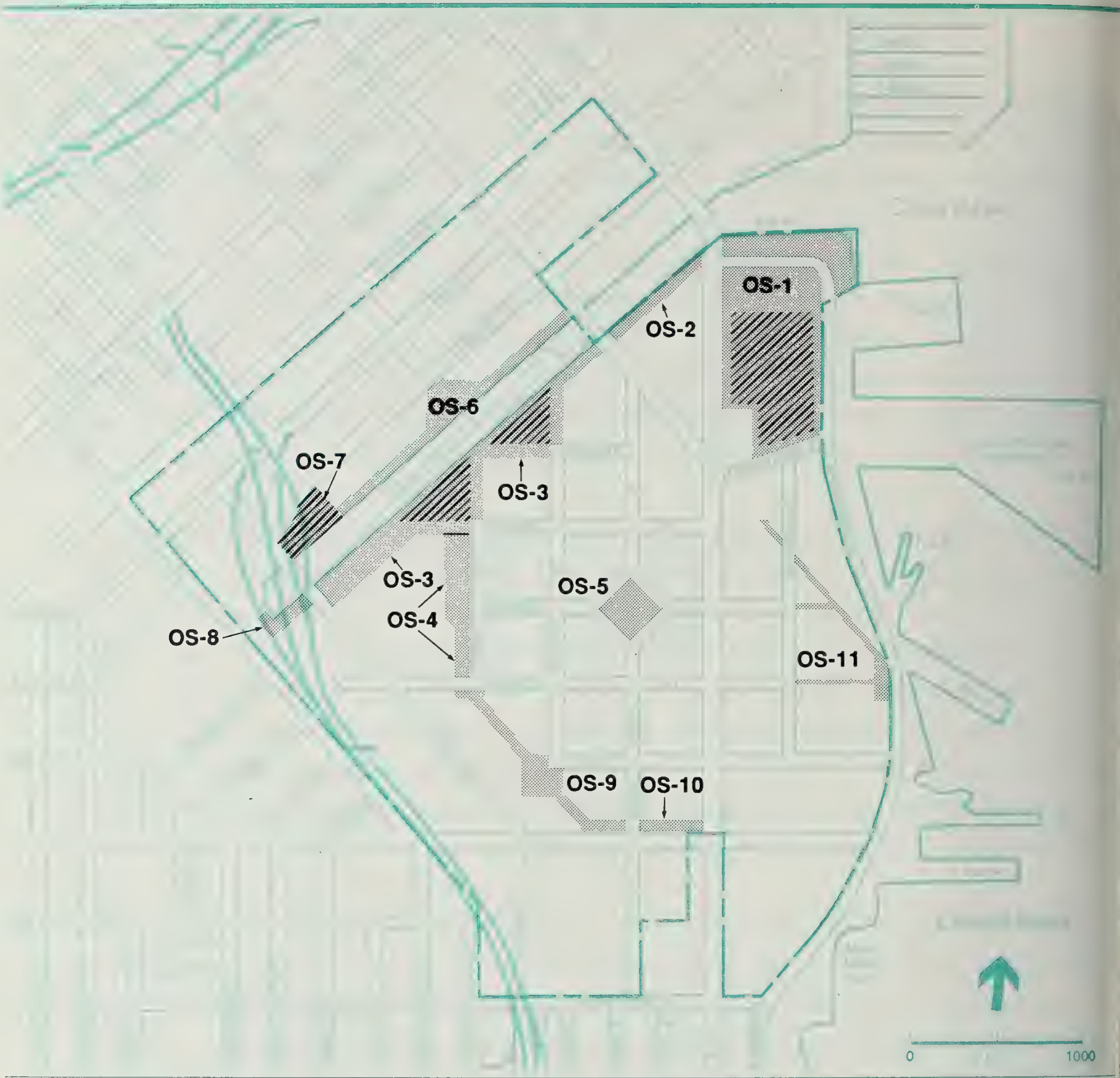
The nearest existing or proposed public open space outside the Project Areas are South Park in the center of the block bounded by Second, Third, Bryant, and Brannan Streets (about 1,000 feet north of the Project Area), open space at the South Beach Marina near the foot of Berry Street (about 1,000 feet northeast of the Project Area), and a recreation center on the northwest corner of Sixth and Folsom Streets (about 2,700 feet northwest of the Project Area, currently under construction). Mission Bay buildings would not shade any of these areas between one hour after sunrise and one hour before sunset at any time of year. Plazas, courtyards, and other private open space areas in the new development adjacent to the Project Area could be subject to shading. Smaller, publicly accessible open space associated with housing, office, and S/LI/RD uses in Mission Bay would also be subject to shading by adjacent structures. Proposed Project Area open spaces would provide opportunities for active and for passive recreation. While both types of use could potentially be adversely affected, shading and lower temperatures could be expected to have a relatively greater impact on passive uses such as sitting or picnicking. Wetlands (under Alternative B) would not be affected. Mission Bay buildings would shade major Project Area public open space as described below.

The shadow discussion divides open space proposed with each Alternative into major open space units. Grouping of open space areas into larger units with related similar orientation and location simplifies the presentation of the shadow analysis. VI.D. Community Services and Infrastructure, Recreation and Parks, pp. VI.D.61-VI.D.86, discusses open space areas and uses for each Alternative. For each Alternative, this section generally describes the open space units and the sources, times and extent of shadow. Table VI.I.3, p. VI.I.59, Table VI.I.4, p. VI.I.64 and Table VI.I.5, p. VI.I.68 summarize shading of open space units for the three times of day on the solstices and equinoxes.

As discussed on p. VI.I.31, the Alternative N scenario anticipates M-2 buildings up to four stories high, with office buildings up to eight stories in the Third and Townsend block. Existing height limits in portions of the Project Area range from 80 to 200 feet, which could permit buildings up to 16 stories which would cast longer shadows (see Chapter V. The EIR Alternatives and Approval Process, pp. V.A.16-V.A.17, for a discussion of Alternative N land use assumptions).

Alternative A

Figure VI.I.12, illustrates Alternative A open space and shows open space units. Table VI.I.3, p. VI.I.59, summarizes shadow coverage for Alternative A and shows percent of each unit or combination of units of open space covered by building shadow. Percent of



MISSION BAY BOUNDARY

▨ ACTIVE SPORTS AREA
(non-hatched open space areas are passive open space)

OPEN SPACE PROVIDED BY 2000	
OS-1	16.5 ACRES
OS-2	1.6 ACRES
OS-3	10.8 ACRES
OS-4	2.5 ACRES
OS-5	2.0 ACRES

OPEN SPACE PROVIDED AFTER 2000 AND BY 2020	
OS-6	3.0 ACRES
OS-7	1.0 ACRE
OS-8	0.5 ACRE
OS-9	3.4 ACRES
OS-10	0.4 ACRE
OS-11	1.6 ACRES

NOTE: This figure does not show additional open space that would be included with housing, office and S/LI/RD uses.

Mission Bay

FIGURE VI.I.1
ALTERNATIVE A OPEN SPAC

SOURCE: Environmental Science Associates, Inc.

TABLE VI.I.3: PROJECT AREA SHADOW CONDITIONS, MAXIMUM BUILDING HEIGHTS AND 40-FOOT BUILDING HEIGHTS, ALTERNATIVE A, BUILD-OUT/2020

			Shadow Coverage (Percent)/a/											
			Spring Equinox (PST)/d/			Summer Solstice (PDT)/e/			Fall Equinox (PDT)/e/			Winter Solstice (PST)/d/		
Open Space/b/	Approximate Area (Acres)	Building Height/c/	10 am	Noon	3 pm	10 am	Noon	3 pm	10 am	Noon	3 pm	10 am	Noon	3 pm
China Basin Park (OS-1)	16.5	Maximum	0	0	10	0	0	0	0	0	10	0	0	40
		40 Feet	0	0	0	0	0	0	0	0	0	0	0	10
North of Channel (OS-6, OS-7)	4.0	Maximum	0	0	30	10	0	20	0	0	10	0	0	30
		40 Feet	0	0	10	0	0	0	0	0	10	0	0	10
South of Channel (OS-2, OS-3, OS-8)	12.9	Maximum	50	20	0	30	20	0	50	30	10	70	50	30
		40 Feet	20	10	0	10	10	0	20	10	0	40	20	10
North-South Corridor (OS-4)	2.5	Maximum	0	0	80	0	0	40	20	0	50	10	10	100
		40 Feet	0	0	40	0	0	20	0	0	30	0	10	70
Northwest-Southeast Corridor (OS-9)	3.4	Maximum	10	30	80	30	0	30	30	20	80	50	80	100
		40 Feet	10	20	40	10	0	20	10	10	40	30	40	80
16th Street Park (OS-10)	0.4	Maximum	0	0	0	0	0	0	0	0	0	40	10	60
		40 Feet	0	0	0	0	0	0	0	0	0	20	0	20
Central Square (OS-5)	2.0	Maximum	10	0	20	0	0	0	20	0	10	40	20	70
		40 Feet	0	0	0	0	0	0	0	0	0	10	10	30
Michigan Street Corridors (OS-11)	1.4	Maximum	40	70	80	20	30	60	30	60	80	60	70	100
		40 Feet	30	60	80	20	20	60	30	60	70	60	70	100

/a/ Rounded to nearest 10%. Shadow coverage of less than 5%, therefore, is shown as 0%.
/b/ Designations in parentheses are open space units defined in VI.D. Community Services and Infrastructure, Recreation and Parks, and Figure VI.I.12, p. VI.I.58.
/c/ See Appendix A. Table XIV.A.1, p. XIV.A.1, and Figure XIV.A.2, p. XIV.A.5, for height limit characterizations for Alternative A. The 40-foot height limit column summarizes shadow effects relative to Sunlight Ordinance criteria.
/d/ Spring Equinox (about March 21) and Winter Solstice (about December 21) are Pacific Standard Time (PST).
/e/ Fall Equinox (about September 21) and Summer Solstice (about June 21) are Pacific Daylight Time (PDT).

SOURCE: Environmental Science Associates, Inc.

shadow coverage is rounded to the nearest 10%; coverage less than 5% is given as "0" in the table. The text may thus refer to some minimal shadow effects that are noted as 0 in the corresponding table entry.

China Basin Park. China Basin Park (OS-1) would be a 16.5-acre area in the northeast corner of the Project Area. About eight acres would be used for active sports, possibly including a recreation building; the remaining area would be available for passive recreation. Buildings which would shade this area are the community facilities building (up to 70-foot maximum height) to the south, and the 110-foot hotel across Third Street to the west. The community facilities building would shade the southernmost portions of the open space in the morning hours, leaving more than 95% of the open space in sun at 10 a.m. (early morning shadows would be less). The hotel would begin to shade China Basin Park after noon, especially in winter. Afternoon shadows from both the hotel and community facilities would shade the western portion of the open space. At 3 p.m. between the spring and fall equinoxes, the majority of the open space would be still in sun; shading would increase during fall and winter, with almost half of the open space being shaded at 3 p.m. during the winter solstice. Shadows would increase after 3 p.m.

North of Channel. North of Channel open space (OS-6 and OS-7), about four acres in area, would include three acres for passive recreation and one acre near the freeway for active sports. Because the area would be separated from buildings to the south by the channel and open space south of the channel, the North of Channel open space would not be shaded by those buildings at any time. However, new shadow affecting this open space would come from 110-foot HDR buildings to the east and west. The open space would be almost completely in sun throughout the morning, and would be slightly shaded by the adjacent residential buildings at 3 p.m. Shadows would increase after 3 p.m.

South of Channel. South of Channel open space (OS-2, OS-3, and OS-8) includes about 12.9 acres west of Third Street, extending south to the extension of Tiernan Street. About four acres would be used for active sports, possibly including recreation buildings, while the remainder would be used for passive recreation. The area would be bounded by 70- to 90-foot MDR and MHDR buildings and the 110-foot hotel to the south, and the CalTrain commute station to the west. Buildings to the south would shade over half of the open space at 10 a.m., except during the summer. Early morning shadows would be greater. Shadows would shorten as noon approached. During the afternoon, the bearing of the sun would be generally in line with the southwest-northeast orientation of the open space, resulting in lesser, or no, shade compared to the morning.

North-South Corridor. The North-South Corridor (OS-4) would be a 2.5-acre corridor west of North Iowa Street with a walking and bike path. MDR and MHDR buildings with maximum heights of 70 to 90 feet would bound the area on the east and west. The eastern portion of the North-South Corridor would be shaded in the morning by the MDR buildings to the east. Each morning shadows would decrease until, at 10 a.m., the shadow would touch the eastern edge of the open space in fall and winter, but not in spring and summer. Noon shadows would be confined to a small area adjacent to the MHDR buildings to the west. Shadows from the residential buildings would lengthen steadily during the afternoon, shading a large portion of the corridor in the afternoon (up to 100% at 3 p.m. in winter).

Northwest-Southeast Corridor. The Northwest-Southeast Corridor (OS-9) would be a 3.4-acre corridor providing passive recreation and a paved walking and bike path. The area is bounded by MDR and MHDR buildings with 70-foot to 90-foot maximum heights. The corridor would be partially shaded at 10 a.m. (shadows would be greater before 10 a.m.). Shadows at 10 a.m. would be the most extensive during winter (about 50% shade). By noon, shadows from the residential buildings to the south would extend further into the corridor, shading a large portion by 3 p.m. Shadows would continue increasing after 3 p.m. (except in winter, when shading already covers 100% of the corridor at 3 p.m.).

16th Street Park. The 16th Street Park (OS-10) would be about one-half acre on the north side of 16th Street, west of Third Street, and would continue the open space path from the Northwest-Southeast Corridor. The park would be partially shaded by retail buildings (50-foot maximum height) on the south side of 16th Street. Shadows would extend across 16th Street throughout the day during winter, shading a small portion of the site at noon, and a larger portion in the morning and afternoon; shadows would not extend across 16th Street between 10 a.m. and 3 p.m. during other times of the year.

Central Square. Central Square (OS-5) would be a two-acre square in the center of the Project Area. This area would provide a neighborhood park for passive recreation. The square would be surrounded by MDR (70-foot maximum height) buildings, separated from the open space by streets. During winter, shadows from the residential buildings to the south would extend into the square, shading less than half of the square during the late morning and noontime hours, and most of the square in the afternoon. During spring and fall, about one-fifth of the square would be shaded. Summer shadows would not extend into the square between 10 a.m. and 3 p.m. Before 10 a.m. and after 3 p.m., shadows would be greater.

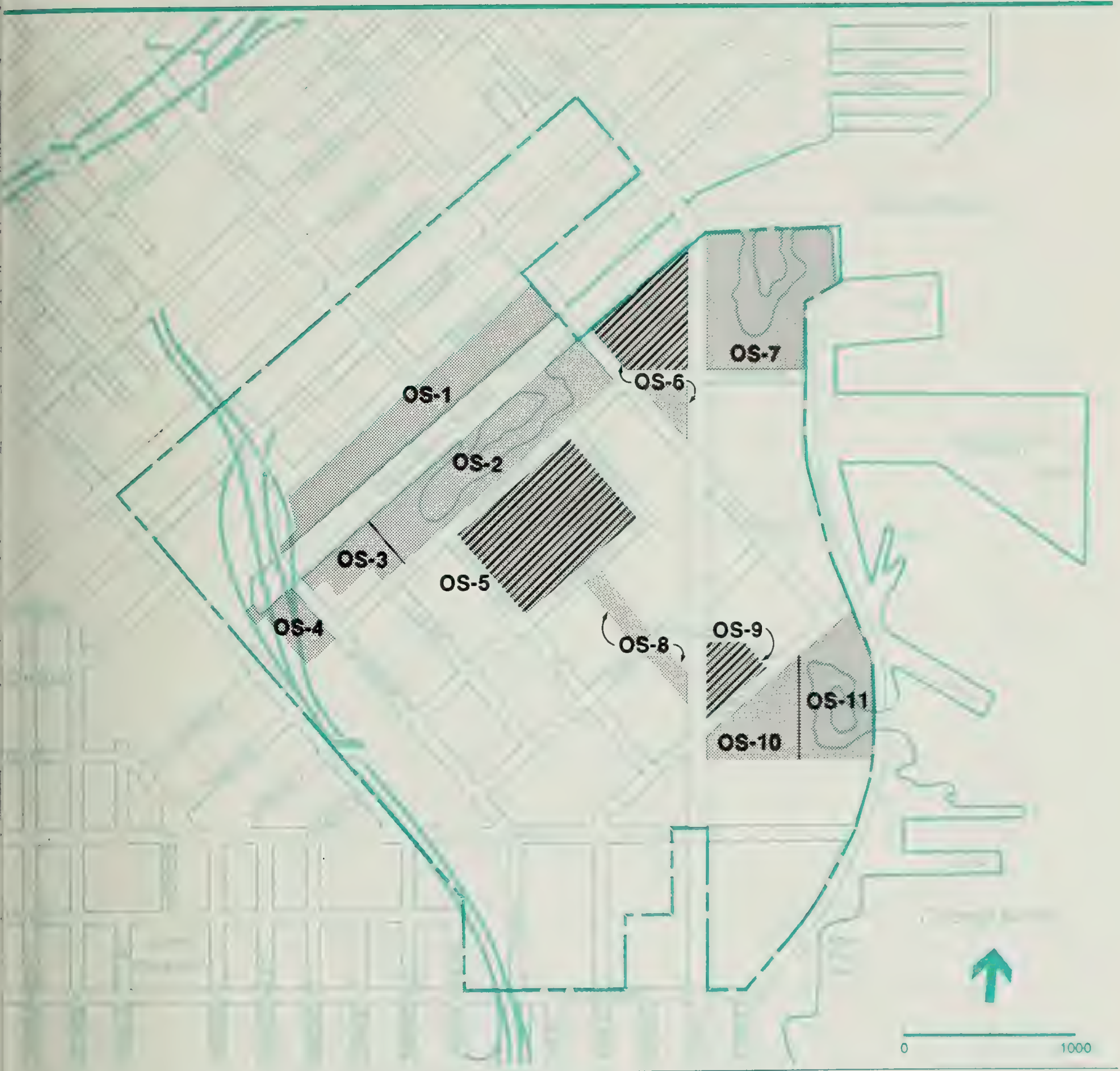
Michigan Street Corridors. The Michigan Street Corridors (OS-11) would be a series of narrow open spaces totaling 1.6 acres. The main corridor, aligned from the northwest to southeast, has two smaller corridors branching off to the west, and would widen to a small open space area at its southeast end. The corridors would be used for passive recreation and would contain a paved walking and biking path. These areas would be shaded by LDR and MDR buildings to the south, with 50-foot and 70-foot height limits, respectively. The majority of the open space in the east-west corridors would be in shade throughout the day. The open space in the northwest-southeast open space and the small area at the southeast end of the corridor would be partially shaded in the morning, with shadows increasing in the afternoon.

Shadow Conditions for 40-foot Buildings. Because the assumed heights of all buildings for Alternative A would exceed 40 feet, shadows resulting from 40-foot buildings would be less extensive. The differences would be greatest for shadows from taller buildings (e.g., the 110-foot hotel and HDR buildings and 90-foot MHDR buildings); differences in shadows from 50-foot LDR and retail buildings would be much less. Table VI.I.3, p. VI.I.59, estimates shadow coverage resulting from 40-foot buildings at 10 a.m., noon, and 3 p.m., on the spring and fall equinoxes and the summer and winter solstices.

Alternative B

Figure VI.I.13, p. VI.I.63, illustrates Alternative B open space and shows the open space units, and Table VI.I.4, p. VI.I.64, summarizes shadow coverage for Alternative B and shows percent of each unit or combination of units of open space covered by building shadow, rounded to the nearest 10%.

China Basin Park. China Basin Park (OS-6, OS-7) would be an area of about 20.9 acres in the northeast corner of the Project Area. This would include two irregularly shaped open space areas totaling 7.3 acres which would provide shoreline access and active and passive recreational uses, and a 13.6-acre wetlands. Buildings which would shade the area include medium density residential units (70-foot maximum height) to the southeast and the 50-foot low density residential units west of Third Street. The medium density residential buildings would shade the southernmost portion (10% or less) of the wetlands between



– – – MISSION BAY BOUNDARY

▨ ACTIVE SPORTS AREA (non-hatched open space areas are passive open space)

OPEN SPACE PROVIDED BY 2000

OS-1	11.0 ACRES
OS-2	13.2 ACRES
OS-3	3.2 ACRES
OS-4	2.1 ACRES

OPEN SPACE PROVIDED AFTER 2000 AND BY 2020

OS-5	13.2 ACRES
OS-6	7.3 ACRES
OS-7	13.6 ACRES
OS-8	2.4 ACRES
OS-9	2.8 ACRES
OS-10	6.3 ACRES
OS-11	7.0 ACRES

NOTE: This figure does not show additional open space that would be included with housing, office and S/LI/RD uses.

FIGURE VI.I.13
ALTERNATIVE B OPEN SPACE

SOURCE: Environmental Science Associates, Inc.

TABLE VI.I.4: PROJECT AREA SHADOW CONDITIONS, MAXIMUM BUILDING HEIGHTS AND 40-FOOT BUILDING HEIGHTS, ALTERNATIVE B, BUILD-OUT/2020

			Shadow Coverage (Percent)/a/											
			Spring Equinox (PST)/d/			Summer Solstice (PDT)/e/			Fall Equinox (PDT)/e/			Winter Solstice (PST)/d/		
Open Space/b/	Approximate Area (Acres)	Building Height/c/	10 am	Noon	3 pm	10 am	Noon	3 pm	10 am	Noon	3 pm	10 am	Noon	3 pm
China Basin Park (OS-1)	16.5	Maximum	0	0	10	0	0	0	0	0	10	0	0	40
		40 Feet	0	0	0	0	0	0	0	0	0	0	0	10
North of Channel (OS-6, OS-7)	4.0	Maximum	0	0	30	10	0	20	0	0	10	0	0	30
		40 Feet	0	0	10	0	0	0	0	0	10	0	0	10
South of Channel (OS-2, OS-3, OS-8)	12.9	Maximum	50	20	0	30	20	0	50	30	10	70	50	30
		40 Feet	20	10	0	10	10	0	20	10	0	40	20	10
Central Square (OS-5)	2.0	Maximum	10	0	20	0	0	0	20	0	10	40	20	70
		40 Feet	0	0	0	0	0	0	0	0	0	0	0	10
Central Corridor (OS-8)	2.4	Maximum	10	30	60	30	0	30	20	10	50	30	50	100
		40 Feet	0	20	40	20	0	10	10	10	30	30	40	100
Bayshore Park (OS-9, OS-10, OS-11)	16.1	Maximum	10	10	10	0	10	0	10	10	10	20	20	30
		40 Feet	0	0	0	0	0	0	10	10	10	10	10	20

/a/ Rounded to nearest 10%. Shadow coverage of less than 5%, therefore, is shown as 0%.
/b/ Designations in parentheses are open space units defined in VI.D. Community Services and Infrastructure, Recreation and Parks, and Figure VI.I.13, p. VI.I.63.
/c/ See Appendix A, Table XIV.A.1, p. XIV.A.1, and Figure XIV.A.4, p. XIV.A.7, for height limit characterization for Alternative B. The 40-foot height limit column summarizes shadow effects relative to Sunlight Ordinance criteria.
/d/ Spring Equinox (about March 21) and Winter Solstice (about December 21) are Pacific Standard Time (PST).
/e/ Fall Equinox (about September 21) and Summer Solstice (about June 21) are Pacific Daylight Time (PDT).

SOURCE: Environmental Science Associates, Inc.

10 a.m. and 3 p.m. during winter; these buildings would not shade any of China Basin Park between 10 a.m. and 3 p.m. during other times of the year. Shadows from the low density residential buildings to the west would extend across Third Street into China Basin Park at 3 p.m. in winters. Shadow coverage would be greater before 10 a.m. and after 3 p.m.

North of Channel. The North of Channel open space (OS-1) would be an 11-acre area consisting of a 10.7-acre shoreline park and a 0.3-acre open space area continuing pedestrian access under the freeway. Because the area would be separated from buildings to the south by China Basin Channel and additional open space and wetlands south of the channel together with the lack of adjacent buildings to the east or west, the North of Channel open space would be shaded only to a limited extent by project-related buildings. However, the westernmost portion of the open space would be shaded by the existing freeway structure.

South of Channel. The South of Channel open space (OS-2, OS-3, and OS-4) would total about 18.5 acres and would include about 5.3 acres for passive recreation and pedestrian access and a 13.2-acre wetlands. The open space would be adjacent to two retail areas (50-foot maximum height) to the south and the CalTrain commute station (50-foot maximum height) to the west. Additional retail, open space (OS-5), and low density residential (50-foot maximum height) uses would be across Hooper Street to the south. The retail uses would shade a small portion of the open space (less than 5%) between 10 a.m. and 3 p.m. throughout the year. The CalTrain station would shade a small part of the westernmost portion of the open space during the afternoon. Shadows from the low density residential buildings separated from the open space by Hooper Street would shade the southernmost portion of the open space at 10 a.m. only in winter. The existing freeway structure would shade the westernmost portion of the open space. Shadow coverage before 10 a.m. and after 3 p.m. would be greater.

Central Square. Central Square (OS-5) would be a 13.2-acre square near the center of the Project Area. Throughout the year, 10 a.m. shadows from the MDR buildings (70-foot maximum height) to the south would extend across Hubbard Street to shade a strip of the square (less than 5%). During winter, shadows from the LDR (50-foot maximum height) and MDR buildings would also extend across Hubbell Street at 10 a.m., shading the southernmost portion of the open space. At 3 p.m. during the winter, shadows from the LDR buildings to the west would extend across the street, shading the westernmost portion. During summer, no Project Area buildings would shade the open space between 10 a.m. and 3 p.m. Shadow coverage would be greater before 10 a.m. and after 3 p.m.

Central Corridor. The Central Corridor (OS-8), a 2.4-acre corridor located south of Central Square, would provide a passive open space area, including a paved walking and biking path. Bounded by LDR (50-foot maximum height), MDR (70-foot maximum height), and retail (50-foot maximum height) uses on the east and west, portions of the open space would be shaded at every time of day throughout the year, ranging from less than 5% shade at noon during the summer to 100% shade at 3 p.m. during the winter.

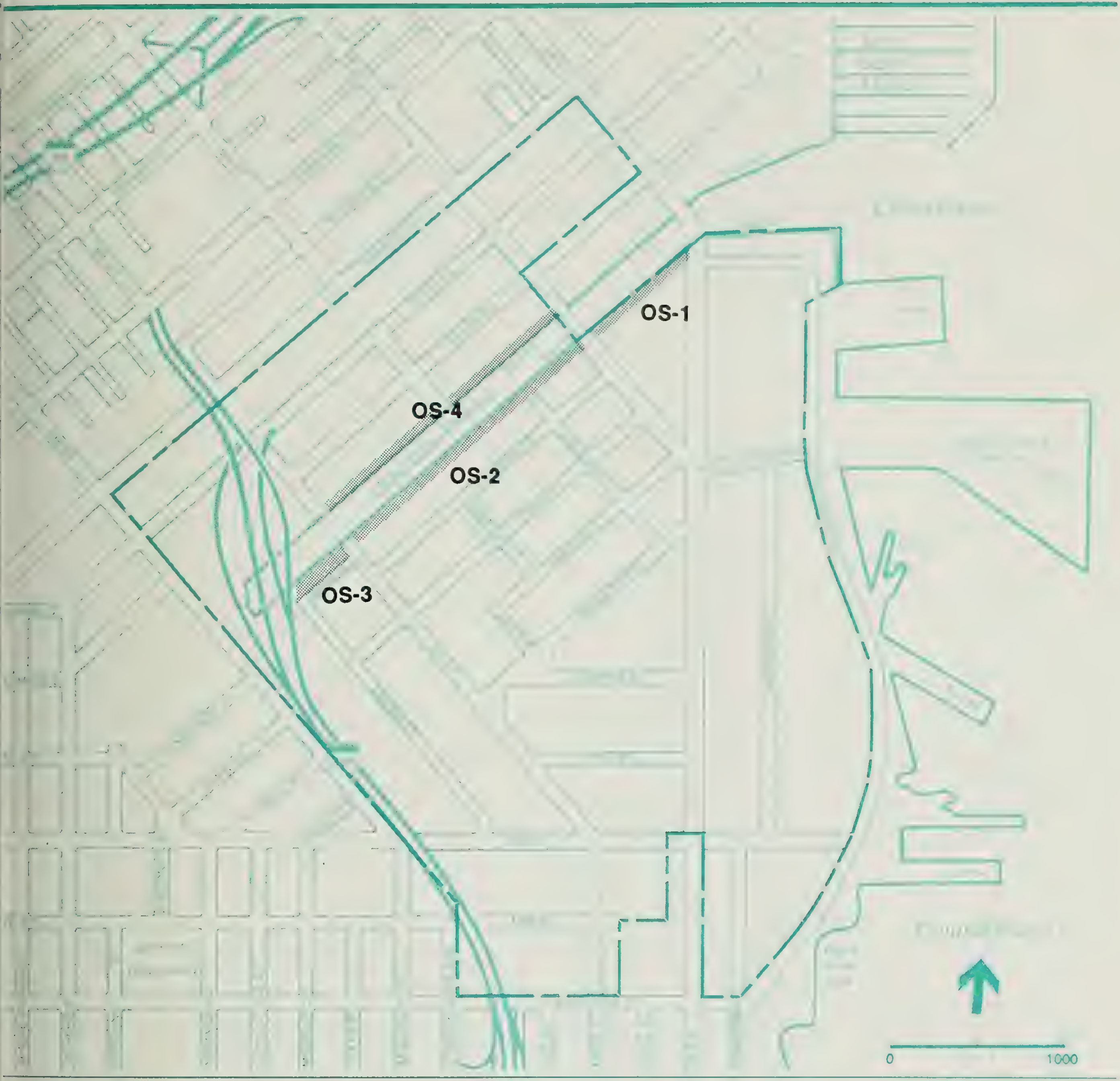
Bayshore Park. Bayshore Park (OS-9, OS-10, and OS-11), about 16.1 acres located in the southeast portion of the Project Area, would consist of a 2.8-acre active sports area, a 6.3-acre area for passive recreation, and a 7.0-acre wetlands. Bayshore Park would be adjacent to MDR buildings (70-foot maximum height) to the south, and is separated from MDR and retail (50-foot maximum height) buildings to the west by Third Street. The southernmost portion of the open space would be shaded by the adjacent residential buildings during all times of the day, throughout the year. On winter afternoons, shadows from the buildings west of Third Street would extend into the open space. Shading of the open space between 10 a.m. and 3 p.m. would range from less than 5% shade in summer to 30% shade in winter.

Shadow Conditions for 40-foot Buildings. Because the assumed height of all building for Alternative B would exceed 40 feet, shadows resulting from 40-foot buildings would be less extensive. The major differences would be shadows from the 70-foot MDR buildings on Bayshore Park, which would be reduced with 40-foot buildings. Table VI.I.4, p. VI.I.64, presents estimates of shadow coverage resulting from 40-foot buildings.

Alternative N

Figure VI.I.14, illustrates Alternative N open space and shows open space units, and Table VI.I.5, p. VI.I.68, summarizes shadow coverage for Alternative N and shows percent of each unit or combination of units of open space covered by building shadow, rounded to the nearest 10%.

North of Channel. North of Channel open space (OS-4) would consist of two open space strips for passive uses, totaling 1.8 acres in area. The open space would be adjacent to



— — — MISSION BAY BOUNDARY

OPEN SPACE PROVIDED BY 2000

OS-1	0.8 ACRE
OS-2	2.0 ACRES
OS-3	0.6 ACRE

OPEN SPACE PROVIDED AFTER 2000 AND BY 2020

OS-4	1.8 ACRES

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE VI.I.14
ALTERNATIVE N OPEN SPACE

TABLE VI.I.5: PROJECT AREA SHADOW CONDITIONS, MAXIMUM BUILDING HEIGHTS AND 40-FOOT BUILDING HEIGHTS, ALTERNATIVE N, BUILD-OUT/2020

			Shadow Coverage (Percent)/a/											
			Spring Equinox (PST)/d/			Summer Solstice (PDT)/e/			Fall Equinox (PDT)/e/			Winter Solstice (PST)/d/		
Open Space/b/	Approximate Area (Acres)	Building Height/c/	10 am	Noon	3 pm	10 am	Noon	3 pm	10 am	Noon	3 pm	10 am	Noon	3 pm
North of Channel (OS-4)	1.8	Maximum	0	0	30	0	0	20	0	0	0	0	0	0
		40 Feet	0	0	30	0	0	20	0	0	0	0	0	0
South of Channel (OS-1, OS-2, OS-3)	3.4	Maximum	80	50	0	70	40	0	80	40	0	90	80	20
		40 Feet	50	30	0	50	20	0	80	30	0	90	80	20

/a/ Rounded to nearest 10%. Shadow coverage of less than 5%, therefore, is shown as 0%.
/b/ Designations in parentheses are open space units defined in VI.D. Community Services and Infrastructure, Recreation and Parks, and Figure VI.I.14, p. VI.I.67.
/c/ See Appendix A, Table XIV.A.1, p. XIV.A.1, and Figure XIV.A.6, p. XIV.A.9, for height limits for Alternative N. The 40-foot height limit column summarizes shadow effects relative to Sunlight Ordinance criteria.
/d/ Spring Equinox (about March 21) and Winter Solstice (about December 21) are Pacific Standard Time (PST).
/e/ Fall Equinox (about September 21) and Summer Solstice (about June 21) are Pacific Daylight Time (PDT).

SOURCE: Environmental Science Associates, Inc.

M-2 Industrial uses (assumed to be up to 40 feet high) to the north, and would be separated from buildings to the south by China Basin Channel and an additional open space strip south of the channel./14/ The open space would be shaded only during late afternoon, when M-2 buildings to the west would shade adjacent areas. Up to a third of the adjacent open space would be shaded at 3 p.m. during spring and summer. The North of Channel open space would not be shaded by buildings to the south at any time.

South of Channel. South of Channel open space (OS-1, OS-2, and OS-3) would consist of three open space strips totaling 3.4 acres. These areas would be bounded by M-2 Industrial uses (50-foot height limit under existing zoning) to the south. The open space would be shaded by the adjacent buildings throughout the year. Shadows would be greatest in the morning when the bearing of the sun generally would be perpendicular to the open space, shading most of the open space in winter; shadows would be less during the afternoon when the bearing of the sun would be generally in line with the open space./13/

Shadow Conditions for 40-foot Buildings. The assumed heights of M-2 buildings north of China Basin Channel are 40 feet; therefore, shadows on Project Area open space from buildings under the 40-foot criteria would be identical to the maximum impacts of those assumed under Alternative N. (The 105-foot office buildings in the Third-Townsend block in Alternative N would not shade Mission Bay open space. Thus, the 40-foot criteria would not affect that conclusion.) Maximum building heights immediately south of China Basin Channel under existing zoning are 50 feet; shadows on the South of Channel Open Space would be reduced with 40-foot buildings. Table VI.I.5, p. VI.I.68, estimates shadow coverage resulting from 40-foot buildings at 10 a.m., noon, and 3 p.m., on the spring and fall equinoxes and the summer and winter solstices.

WIND

Wind Conditions in San Francisco

U.S. Weather Bureau data show that westerly (i.e., from the west) to northwesterly winds are the most frequent and strongest winds during all seasons in San Francisco./15/ Of the 16 primary wind directions measured at the Weather Bureau station at the Civic Center (at a height of 132 feet), four directions comprise the greatest frequency of occurrence as well as the majority of strong wind occurrences. These are northwest, west-northwest,

west, and west-southwest, with occurrence rates of about 10%, 14%, 35%, and 2%, respectively, of the time between the hours of 6:00 a.m. to 8:00 p.m. throughout the year. The remaining 12 wind directions comprise the remaining 36% frequency of annual occurrence with lower wind speeds. Calm conditions occur about 2% of the time.

Average wind speeds are highest during summer and lowest during winter months. However, strongest peak winds occur in winter, when speeds of 47 mph have been recorded./16/ The highest average wind speeds are in the mid-afternoon, and the lowest are in the early morning.

Pedestrian Comfort and Wind Criteria

Wind conditions partly determine pedestrian comfort on sidewalks and in other public areas. In developed areas, buildings about 100 feet or more in height can redirect wind flows around buildings and divert winds downward to street level; each can result in increased wind speed and turbulence at street level.

As an example of criteria for a comfortable wind environment for people, Section 148 of the City Planning Code establishes for the C-3 Downtown Commercial districts an equivalent (includes the effects of turbulence) wind speed (as defined in the Code) of 7 and 11 mph as comfort criteria and 26 mph as a wind hazard criterion. Section 148 sets comfort levels of 7 mph equivalent wind speed for public seating areas and 11 mph equivalent wind speed for areas of substantial pedestrian use. New buildings and additions to buildings may not cause ground level winds that would exceed these levels more than 10% of the time year round between 7:00 a.m. and 6:00 p.m./17/ Section 148 would not apply to Mission Bay, which is not in a C-3 district.

Build-Out/2020

Wind Effects in Mission Bay

Prevailing winds in and near the downtown area, including Mission Bay, are from the northwest, west-northwest, west, and west-southwest. The extent and magnitude of wind effects of new buildings would depend on the actual design, height, bulk and placement of each specific structure in relationship to adjacent buildings, streets and open space areas. This evaluation is therefore general in nature; no wind-tunnel testing could be usefully performed.

Due to the relatively low- to mid-rise character of all Alternatives, little difference in wind conditions would be expected among Alternatives A and B and existing wind conditions. The absence of high-rise buildings, which might be expected to cause substantial increased winds at pedestrian levels, indicates that no such increase in winds should occur.

As discussed on p. VI.I.34, the Alternative N scenario anticipates M-2 buildings generally up to four stories high, with office buildings up to eight stories in the Third and Townsend block. Existing height limits in portions of the Project Area range from 80 to 200 feet, which could permit buildings from 8 to 20 stories; buildings of 100 feet or taller might be expected to increase ground-level wind speeds, depending upon the heights, configurations, and orientations of surrounding buildings and streets. (See V. The EIR Alternatives and Approval Process, pp. V.A.16-V.A.17, for a discussion of Alternative N land use assumptions.)

No winds that meet the hazard level, defined as an hourly average of 26 mph for more than any single hour of the year, could be expected from any of the Alternatives.

In general, ground-level winds would be expected to divide around and flow over the building masses and to follow open, linear features, such as streets and open spaces, that generally align with the wind direction. Thus, for each Alternative and each specific wind condition, streets and open spaces that line up with the wind would be expected to have winds higher than those streets at right angles to the wind.

To the extent that any linear open areas or streets can be kept short or can be interrupted by tall trees, or by buildings or other structures, wind flows along those streets or open areas would be slowed, and pedestrian level wind speeds reduced accordingly.

MITIGATION

ARCHITECTURAL RESOURCES

Measure	Alternative	Description
I.1	A,N	To maintain the architectural integrity of closed Fire Station 30, rehabilitate the building as a new fire station or other community service use. The rehabilitation plan would be developed under appropriate historic preservation standards.

URBAN DESIGN

Measure	Alternative	Description
I.2	A,B	Adopt urban design guidelines for Mission Bay which would include requirements for variation in building height, bulk, tower separation, mid-block paths or courts, and facade materials to relate the architectural character of new buildings to that of existing older buildings fronting Townsend Street, and Seventh Street and to the closed Fire Station 30. This measure would also avoid, to the extent applicable or appropriate, "benching," or developing a row of buildings of similar height over one or more block fronts.
I.3	A,B,N	Adopt urban design guidelines for Mission Bay which would require adequate sidewalk widths and street lighting and landscaping.
I.4	A,B	Develop specific guidelines for landscaping, setbacks, parking location and screening where residential uses would adjoin S/LI/RD areas. These would maintain the visual quality of residential areas, and screen those uses from more intense S/LI/RD activities.
I.5	A,B	Formulate height guidelines, building setbacks and separation of towers to limit scale of office or S/LI/RD development between Owens Street and I-280. These

Measure	Alternative	Description
		would maintain some views of the Project Area and the Bay from I-280, and prevent visual impact of a continuous wall of eight-story buildings immediately east of the 30- to 40-foot-high freeway structure, (while continuing to provide land use and noise buffer transition between the freeway and residential uses).
I.6	N	Reduce the 200-foot height district in the center of the Project Area to 130 feet. That would be consistent with the adjoining existing 130-foot district, and would be generally consistent with the 110-foot maximum height limits proposed for Alternatives A and B. That measure would limit new view blockage by buildings up to 200 feet in Alternative N. While the Alternative N scenario assumes one-to four-story M-2 industrial development, the existing 200-foot district would permit potential view blockage by high-rise structures in the center of the Project Area.
SHADOWS		
I.7	A,B	Include design considerations to reduce the area of open space shadowed such as: – articulation of the building face, resulting in setbacks of portions of the building walls; – setbacks of building levels above 40 feet; – building separation along otherwise continuous frontages; – tower separation and setbacks; – mansard or gable roof treatments that reduce effective rooftops heights at the building frontage, and – reduce the total height of buildings that are adjacent to or near by, and also south, east or west of, public open spaces.

Measure	Alternative	Description
		(Shadowing of public open spaces, as discussed on pp. VI.I.51–VI.I.69, effectively represents maximum shadow from building masses assuming maximum height at the property line along a continuous frontage during general daytime periods of highest use.)
I.8	A,B	If major Mission Bay open space were to be acquired by or were under the jurisdiction of the Recreation and Parks Commission, Proposition K criteria could limit specific Project Area buildings to 40 feet or less. Shadow effects of such buildings are described on pp. VI.I.62, VI.I.66, and VI.I.69 and Tables VI.I.2, VI.I.3, and VI.I.4, pp. VI.I.19, VI.I.59, and VI.I.64. Ownership of or jurisdiction over open space proposed in Mission Bay, and the applicability of Proposition K, has not been determined. If open space were not under Recreation and Park jurisdiction, Proposition K criteria would still provide a general basis for evaluation of shadow effects of specific Mission Bay development on major open space.
WIND		
I.9	A,B	Include design factors to reduce wind speeds and turbulence such as: – building setbacks along street frontages above the second or third floor, and setbacks on all sides for buildings that are more than two stories taller than adjacent structures; and – articulation of the building facade and balconies or bay windows; and – trellises, walls, large mature trees, and other elements to break up wind flows though mid-block lanes and courtyards. The difference between the existing wind environment and the wind environment under any of the Alternatives would

Measure	Alternative	Description
		be expected to be small. Practical design consideration, landscaping and amenities would tend to reduce wind speeds and turbulence along street and in public and private open space areas. Providing windbreaks within open spaces and large street trees along sidewalks and street medians wherever possible would tend to reduce street-level wind speeds. Windbreaks would provide protection for passive uses of parks, and large street trees would provide wind protection along sidewalks and at building entrances.
I.10	A,B,N	Require a qualified wind consultant to review specific designs for buildings 100 feet or more in height for potential wind effects. The review would evaluate the need for windbreak features or further detailed wind-tunnel studies of the proposed structures.

NOTES

SETTING

/1/ In this Architectural Inventory, approximately 10% of the City's entire stock of buildings were rated for architectural merit./1/ The Department of City Planning Architectural Inventory assigned two ratings to each building: (1) an overall rating for architectural appearance and (2) a summary rating that took into consideration the building's architectural rating as well as its importance to the streetscape. The numerical ratings were a low of "0" to a high of "5". In general, buildings with a summary rating of "3" or higher from the DCP survey were considered to represent approximately the best 2% of the architecture in the City.

/2/ This total does not include six rated buildings demolished since the survey was completed.

/3/ Foundation for San Francisco's Architectural Heritage, "South of Market Street - A Brief Guide to its Architecture: Parts I and II,: Heritage Newsletter, Vol. XIII, Nos. 2 and 3, 1986. Unlike Heritage surveys of Downtown, the three South of Market surveys do not specifically publish ratings of buildings on a scale of "A" (highest rating) to "D" (minor or of no importance). The buildings listed in the newsletter articles are mapped and described as "historically and architecturally significant buildings."

/4/ John Snyder, Historic Architectural Survey Report for 4-SF-, I-280 Transfer Concept," CalTrans, August 1983.

/5/ Jonathan Malone, Secretary, San Francisco Landmarks Preservation Advisory Board, telephone conversation, February 17, 1988.

/6/ The photograph in Figure VI.I.2 taken from Potrero Hill shows the entire Mission Bay Project Area. To provide an unobstructed view, the photograph was taken from the roof of the former Patrick Henry School at 639 Vermont Street. The closest approximation of this view at street level is at the corner of Kansas and 19th Streets. Although the viewpoint location is not publicly accessible, it does provide an overall view of the Project Area, similar to those partially available from public streets on Potrero Hill, or those from existing residences or other buildings in north Potrero Hill. The view would vary depending upon the elevation of the street or building; at lower elevations, views of the Project Area are more limited. Higher elevations on Potrero Hill (up to about 300 feet near 22nd and Wisconsin) are further south, and would also not encompass views of the entire Project Area. The Vermont Street photo location is at about the 220-foot elevation.

/7/ San Francisco Department of City Planning, Urban Design Element, adopted by City Planning Commission, Resolution 6745, August 26, 1971.

IMPACT

/8/ San Francisco Department of City Planning, South of Market Plan, Proposal for Citizen Review, June 1985.

/9/ San Francisco City Planning Code Section 260, allows for exit stairways, elevators and mechanical penthouses, etc. to exceed the height limit by 16 feet.

/10/ San Francisco City Planning Code Section 270 regulates height, bulk and setbacks.

/11/ Bulk controls apply above specific heights (50 to 80 feet). Up to those heights there is no limit to the width of a building. Above those heights, bulk district designation limits building plan dimensions.

/12/ San Francisco City Planning Code, Zoning Map Sheets 1, 1H, 8 and 8H.

/13/ The shadow analysis is based on generalized shadow diagrams prepared by Environmental Science Associates, Inc.

/14/ As discussed on p. VI.I.35, existing height limits in the Project Area range from 40 to 200 feet, with 130 to 200-foot districts south of Hooper Street. One-hundred-thirty-foot to 200-foot buildings in those height districts would not change the shadow effects on open space described for Alternative N.

/15/ The U.S. Weather Bureau data used in this analysis were originally gathered at the weather station atop the old Federal Building at 50 United Nations Plaza at the Civic Center during the years 1945-50. Data were taken hourly, annually for 16 wind directions. The data base, comprised of 32,795 hourly observations, is of sufficient length to provide a reliable estimate of future climatic conditions in San Francisco.

/16/ E. Jan Null, "Climate of San Francisco," NOAA Technical Memorandum, NWS WR-126, February 1978.

/17/ Section 148 of the City Planning Code specifies the hours of 7:00 a.m. to 6:00 p.m. The available weather data that include the interval cover the hours of 6:00 a.m. to 8:00 p.m. Thus, observation from two additional evening hours and one additional morning hour are included in these data. Because, in general, winds are stronger in the afternoon and evening than in the morning, this approximation is conservative - it is likely to overestimate existing and projected wind speeds.

J. CULTURAL RESOURCES

SETTING

PREHISTORY

Prehistoric Period, 2500 B.C. to 1500 A.D.

The prehistoric occupation and use of the San Francisco Bay Area are not well known. The majority of prehistoric archaeological sites that are believed to have existed in San Francisco are either totally destroyed or inaccessible due to surface cover. As San Francisco developed quickly during the Gold Rush, it is likely that numerous archaeological sites were destroyed before systematic archaeological recording and evaluation procedures were practiced.

However, on the basis of archaeological data from San Francisco sites that have survived, and information from sites located in other Bay Area counties, and ethnographic sources, it is possible to present at least a partial picture of prehistoric habitation in the region. The prehistoric human way of life in the San Francisco area involved a hunting and gathering network of subsistence systems. Seasonally, parties went out from villages to temporary camps within their territory to exploit the various available resources through hunting and gathering of mussels and shellfish, salmon, seals and land mammals, and intensive use of plant foods, including the common use of acorns.

Protohistoric Period, 1500s to 1770s

The California Indians who occupied the San Francisco Peninsula at the time of European contact are known as the Costanoan. The term Costanoan is derived from the Spanish word "Costanos," meaning coast people. No native name for the Costanoan people as a whole is known to have existed in prehistoric times. Scholars believe the Costanoans were neither a single ethnic group nor a political entity./1/ Native Americans living in the Bay Area today prefer the term "Ohlone," meaning the "Abalone people" when referring to their ancestral identity. The term Costanoan also designates a language family consisting of eight languages.

HISTORY

The Spanish/Mexican and Gold Rush Eras, 1770s to 1860s

Before the Gold Rush, nearly all of the Project Area was encompassed by Mission Bay, which derived its name from the Spanish mission located at Laguna de Los Dolores. Established in 1776, Mission San Francisco de Asis (or Dolores) lay slightly more than a mile west of the bay, at what is now the intersection of 16th and Dolores Streets. Mission Bay was a half-moon-shaped indentation in the shoreline of San Francisco and perhaps the most topographically pronounced cove, bay or creek on the peninsula (see Figure VI.N.1, p. VI.N.6.). At high tide the waters of the bay were bounded approximately by Eighth Street to the west, Brannan Street to the north and 16th Street to the south./2/ With a depth of one foot or less at mean low tide and rising to a maximum of five to six feet at high tide, Mission Bay measured approximately 260 acres./3/

Mission Creek entered Mission Bay almost at the center of its shoreline and was the main drainage channel for the east-facing slope of Twin Peaks and adjacent areas. Along its course, where spring tides were liable to flood, the creek was lined with marshes./2,4/ The marshes surrounding bay and creek covered approximately 330 acres./5/

Mission Bay waters were shallow but navigable. So too was Mission Creek and "navigation by small boat or Indian tule canoe of about a mile up Mission Creek would bring a traveler within a quarter of a mile of the Mission."/6/ John Young asserted that "in the early 19th century, several boats as large as 'two 30-ton schooners' built at Fort Ross carried hides and tallow and engaged in trading activities between the missions around the San Francisco Bay, including the Mission Dolores landing on Mission Creek."/7/ Mission Bay was not used extensively as a harbor or place of anchorage in the pre-Gold Rush era; better harbor facilities and a larger population and settlement were present at nearby Yerba Buena Cove to the north. Before the Gold Rush, the Project Area and what is now the south of Market region apparently were uninhabited.

During and after the Gold Rush, Mission Bay waters undoubtedly were used by San Francisco Bay scow schooners and similar craft. The use of Mission Creek was indicated by the fact that the State Legislature determined in 1854 that the creek was navigable, and when a franchise was issued for the Brannan Street road in 1855, the construction of a drawbridge (outside the Project Area) was required so as "not to obstruct the free navigation of the creek."/8/ What remains of Mission Creek is now known as China Basin Channel.

The Gold Rush did not immediately transform the Project Area. In the late 1840s and 1850s, San Francisco development concentrated at the Yerba Buena Cove waterfront north of Mission Bay, which was deeper and more accessible to ocean-going vessels. The most notable development within the Project Area was the establishment of shipbuilding facilities at Steamboat Point, located approximately at Fourth and King Streets. The feverish demands of the settlers and miners for vessels to take them to the trailheads on the Sacramento and San Joaquin River systems, as well as to the Humboldt Bay region, made shipbuilding one of San Francisco's first boom industries. The need to maintain and build vessels for the transportation of freight and passengers to the East Coast further stimulated this enterprise.

The Coast Survey Chart of 1853 (compiled in 1853 or earlier) shows three structures, probably associated with shipbuilding and maintenance, on the shores of Steamboat Point. Certainly, by the late 1850s, shipbuilding was a flourishing industry at that location. All that was required for a shipyard was proximity to water and a sliver of flat land big enough on which to set up the vessel, as it was materials and craftsmen that actually constituted the shipyard. By the late 1850s, shipbuilding was not the only activity at Steamboat Point. Saloons and dwellings also were located "at King and Steamboat Point" and "at the foot of Third Street."/9,10/ These facilities probably catered almost entirely to the shipyard workers, considering their somewhat remote location from the other parts of the City. By 1861, however, the shipbuilders were starting to move away from Steamboat Point. The completion of Long Bridge in 1868 across the mouth of Mission Bay, directly linking downtown San Francisco with the Potrero District and Hunters Point, encouraged the migration of the shipbuilding industry away from Steamboat Point, so that by the 1870s, Hunters Point was the City's major shipbuilding center.

During the early 1850s, a Chinese fishing village was established close to the northern periphery of the Project Area (just east of the intersection of Bryant and Second Streets). Sampans associated with this village would have been ideal for navigating Mission Bay, while the junks quite likely carried passengers and cargo from China.

Some bay fill may have occurred around Mission Creek in the late 1850s, and by the early 1860s, development had begun to occur in the Project Area that foreshadowed its evolution by the 1880s into one of San Francisco's prime industrial areas. At the same time that bay filling was beginning, transportation was improving. The growth of public transportation in the 1850s, horse-drawn omnibuses, aided this development. Routes linked South Park -- an elite residential neighborhood a few blocks north of the Project Area -- with Portsmouth Square, the Presidio and North Beach. San Franciscans used boats to get around the City as well, and one rowboat line carried passengers from the downtown waterfront to Mission Dolores by way of Mission Bay and Mission Creek./11/ Rowboats and horse-drawn omnibuses became a rarity by the 1860s with the founding of the first street railroads. Among those was the Omnibus Railroad, which opened in 1861. That railroad had a complicated route running between Mission Dolores and the end of Powell Street on the Bay. The route included Third Street in the Project Area. During the 1860s, the terminus of this branch of the Omnibus Railroad was near King and Third Streets./12,13,14/

The Origins and Evolution of a Pioneer Industrial Area, Mid-1860s to 1900

Prior to the mid-1860s, relatively little development had taken place in the Project Area and the southern waterfront of San Francisco. Only a limited amount of filling had occurred, along the fringes of the northern shores of Mission Bay. While the filling of Mission Bay was not complete even by the 1890s, by the late 19th century the Project Area, the southern waterfront and the South of Market area had become a major industrial and commercial area that mirrored the progress and industrial diversity of San Francisco's development during this period.

Long Bridge was built across Mission Bay in 1868 from the foot of Fourth Street near Steamboat Point to the present day intersection of Third and 16th Streets near Point San Quentin. Long Bridge both stimulated and reflected the accelerating development of the northern and southern fringes of Mission Bay. The mid-1860s saw the first appearance of early industrial establishments in the two blocks bounded by Second, Fourth, Townsend, and King Streets, a portion of which is in the Project Area, and also in one block near the southern boundary of the Project Area on Minnesota Street between Mariposa and 17th Streets. Two major industrial enterprises were the Citizens Gas Works, established in 1863-1864 at the junction of Townsend, King and Second Streets and the Pacific Oil and Lead Works, established in 1866 near the center of the block bounded by Second, Third, Townsend and King. By 1877, the portion of Mission Bay southwest from Steamboat Point to the mouth of Mission Creek had been filled. Two large triangular wharves were built on the east side of Long Bridge just south of the present-day channel; and new fill was added for wharves on the north side of the channel east of Fourth Street. The fill along Long Bridge was widened, and substantial areas of fill were added on the northern and eastern sides of Point San Quentin (see Figure VI.N.1, p. VI.N.6).

Two other pioneer industrial establishments from this era were the glass factories of the Pacific Glass Works and the San Francisco Glass Works. The Pacific Glass Works plant was located outside the Project Area on Minnesota Street, just north of its intersection with Maripósa Street. It was the first successful glass works on the Pacific Coast and its establishment was welcomed, since in the early 1860s San Francisco alone was importing between 125,000 and 150,000 bottles a year. This glass works lasted from 1863 until 1876 when it merged with its main competitor, the San Francisco Glass Works in the Project Area on the south side of Townsend Street, between Third and Fourth Streets. After an 1868 fire, the plant reopened at the same site. In 1870, however, the San Francisco Glass Works opened a new factory on King Street, between Fourth and Fifth Streets. In 1887, the plant moved to the northeast corner of Townsend and Seventh Streets, adjacent to the Project Area./15/

The history of industrial development of the Project Area in the late 19th century must stress the broad involvement of the Southern Pacific Railroad. The railroad was also the largest landholder in the Project Area for almost the entire post-Gold Rush era, and played the most important role in the filling of Mission Bay. In the 1870s, Southern Pacific constructed a railroad terminus in San Francisco. In addition to the main terminal building, other large structures were built: three large freight warehouses were erected on Townsend and King Streets between Fourth and Fifth Streets and on Kentucky Street (present-day Third Street) near Long Bridge./16/ Building of a railroad terminus in the Project Area also helped shape the pace and character of the area's economic development.

Information concerning the precise chronology and the location of fill is sparse. Figure VI.N.1, p. VI.N.6 shows the approximate locations and dates of fill. By 1884, substantial new areas of fill around the now-enclosed Mission Bay had been added, along with a long finger pier that extended southwest along the south side of the present-day channel, with a spur extending southeast into the center of Mission Bay. Fill was also added along the north side of the present-day channel westerly from Fourth Street. By

1892, additional fill had been placed around the margins of Mission Bay, leaving a totally enclosed body of water cut off from San Francisco Bay. During this period, two large areas of fill were placed east of Long Bridge. During the 1890s, Southern Pacific gradually developed its property in the Project Area and increased the number of spurs and sidings to accommodate growing freight traffic. By 1903, more than two-thirds of the Southern Pacific's holdings inside Long Bridge as well as an additional eight acres on the east side of the bridge were reclaimed land. By this time, the salt marshes along Mission Creek had disappeared because fill placed in Mission Bay reduced the tidal flow of sea water that nourished the marshes./17/ The remaining, now-stagnant open water in the center of the former Mission Bay was filled in with earthquake rubble following the 1906 earthquake. Between 1892 and 1913, the area east of Point San Quentin and Long Bridge (Third Street) was also filled to approximately its existing extent.

The major industries that developed in Mission Bay in the late 19th century were associated with California's booming lumber industry. Lumber was stored, shipped or made into finished products at many sites in the Project Area. California was one of the nation's most important lumber-producing states from the mid-19th century into the 20th century. While coastal lumbering port towns such as Eureka could export lumber directly to the East Coast and foreign markets, most lumber cut in northern California was shipped first to San Francisco. The bulk of it was, at least until the end of the 19th century, consumed in the San Francisco Bay Area for construction of homes, ships and railroads. Wood remained the primary source of energy in America until very late in the 19th century, when it was replaced by coal, oil and electric power. The lumber that was not absorbed by the Bay Area market was shipped by rail to southern California and the East Coast, and by ship to foreign countries.

The Project Area was ideally situated to capitalize on the lumber trade. It could receive ships engaged in the coastal lumber business, while railroads brought in lumber produced in California's inland counties. Shipping and railroad facilities made it an excellent place from which to transport milled lumber or finished wood products. Some companies preferred to convert their lumber into finished products at factories or workshops in the Project Area.

The first lumber entrepreneur to locate in Mission Bay was Charles Hooper at a plant on the south side of Townsend Street between Third and Fourth Streets in 1865; he moved in

1867 to the south side of China Basin Channel between Third and Fourth Streets. His yard soon was surrounded by other large lumberyards, such as the Pacific Pine Lumber Company, immediately south of his yard.

By the 1880s, almost all the businesses in this area were wood-related, and included the California Cigar Box factory; J.R. Fairweather's Sash, Door and Blind Company; George Windeler's Cooperage; and Andrew Frei's Furniture Company./18/ Hooper's own business on Channel Street between Third and Fourth Streets was still in existence in 1913 and probably continued for some years thereafter.

Other major lumber companies that were established in the Project Area by the late 1880s were the Truckee Lumber Company on Berry Street between Fourth and Fifth Streets; the Sierra Lumber Company at Fourth and Berry Streets; the Kennedy and Shaw Lumber Company on Fourth Street between Channel and Berry Streets. Andrew Frei's Furniture Manufactory, on the south side of King Street between Third and Fourth Streets, expanded by 1887 with a furniture warehouse on King Street towards Third Street.

The rapid development and diversification of California agriculture in the late 19th century created the need for plants to store large quantities of produce and to preserve or can meat, fruit and vegetables. The preservation of perishable foods was a major problem for California farmers, especially as they sought to exploit a growing national and world market. Transportation of produce, even with good rail connections, could take weeks and even months in the case of foreign export. The majority of California's rapidly expanding citrus crop was preserved by canning. The Pacific Can Company, a major plant outside the Project Area on the north side of Townsend Street between Sixth and Seventh Streets, was operational by 1887, or earlier. Two hundred men were employed and 250,000 cans of all shapes and sizes were turned out daily. The plant operated at least until 1902.

Several large plants in the Project Area produced, obtained or distributed ice for food preservation, often combined with refrigerating a particular line of produce. On the east side of Fourth Street between Berry and King Streets was the Union Ice Company. The company was in operation by 1882 and continued at the same location until 1907. The Brown Ice House and Meat Packing Plant was adjacent to the Union Ice Company on Fourth Street. It began business as the Mutual Ice Company in 1879 and by 1883 was the Mountain Ice Company. By 1891 this company was no longer in business./19/ There were several other smaller ice plants in the Project Area as well. Another major food enterprise was the National Vinegar Works on the south side of Berry Street between Fourth and Fifth Streets, in operation between 1884 and 1896./20/

The availability of space and excellent transportation for large and bulky goods resulted in the establishment by the 1880s of numerous warehouses in the Project Area. On the north side of Berry Street between Fifth and Sixth Street were the Studebaker Brothers, manufacturing carriages and wagons, and a large warehouse. On the north side of King Street between Third and Fourth Streets was the Arizona Warehouse. It operated from 1886 to at least 1898 but no later than 1919, when the site was covered by a Southern Pacific freight shed.

The nature of manufacturing in the Project Area in the late 19th century mirrored San Francisco as a whole in that it was characterized by great diversity and not dominated by one or a few industries. Although wood-product industries were the most important general category of manufacturing in the City, other enterprises included brick manufacturing, iron processing and manufacturing, and shipbuilding.

The center of the San Francisco shipbuilding industry had moved to the south of the City by the 1880s, but some shipbuilding activity continued in the Project Area. Patrick H. Tiernan, a shipbuilder who had moved away from Steamboat Point in the mid-1860s, relocated near the southern tip of the Project Area at the foot of 17th Street on the east side of present-day Third Street. That shipyard later was occupied by the Dickie Brothers who built large ocean-going vessels./21/

On the south side of Berry Street between Sixth and Seventh Streets were the shipyards of Boole and Beaton and of Alexander Hay. One block to the northeast, Hay had another large shipyard on the south side of Berry Street. In the late 1880s, they were the largest builders of steam schooners on the West Coast. Such vessels no longer were dependent on the vagaries of the wind and could transport much more cargo than the largest sailing schooners. Precise dates of these shipbuilders' operations are not known; they began operations in the early 1880s, but by the end of the decade both concerns had left the area. By 1891 Boole and Beaton had moved its shipbuilding operations to Oakland and Hay's yard was occupied by a Standard Oil Company storage tank and a lumberyard belonging to the Pacific Lumber Company./22/ By 1887, Standard Oil Company had erected six large storage tanks on Sixth Street between King and Berry Streets.

Two other oil companies were operating in the Project Area in the mid-1890's by that time. Next to Hay's shipyard on the south side of Berry Street between Sixth and Seventh Streets was the American Oil Company; the petroleum oil firm was still at that location in 1890, but by 1891, the space was occupied by the Pacific Brick Company./23/ The Arctic Oil Works, a whale-oil plant, was located from 1884 until 1902 in the vicinity of Illinois and 16th Streets.

Several wool processing and chemical plants also contributed to the industrial diversity of the area in the late 19th century. Calton Bell and Company was the most prominent of the wool operations, located from 1876 to 1905 on the north side of Townsend Street between Sixth and Seventh Streets north of the Project Area. Also located on the north side of this block, from 1867 to 1894, was the Golden City Chemical Works.

By 1887 numerous boarding houses, saloons and restaurants catered to the Project Area's workers. Representative of these was the Crystal Hotel established in 1887 on the northeast corner of Fourth and Berry Streets. The property evidently survived the 1906 earthquake as it was still in business in 1907./24/ The Cuckoo's Nest at the southeast corner of Fourth Street near the channel fed the numerous workers in the area.

There were many workers, however, who were not fortunate enough to lunch at the Cuckoo's Nest and were forced to eke out an existence by more painstaking means. Some time between 1869 and 1877, the City established a major dump on Berry Street between Fifth and Sixth Streets shortly after that location had been reclaimed from Mission Bay. By the 1870s, so many indigent men lived in shanties on the edges of the dump that it was called "Ragtown."/25/

The dump grew southwards from Channel Street between Sixth and Seventh Streets until it is said to have covered an area of 20 acres, most of which was owned by Southern Pacific. Foraging through the dump developed into an industry. As early as 1878 an "Old Italian" acquired "scavenger control" of part of the dump, charging people for the right to scavenge on his terrain. By 1889 a large part of the dump was controlled by a "dump trust" of six people who employed "6 men at $9 per week" as scavengers. Garbage was hauled to the dump by as many as 300 teams of horse-drawn drays daily from the industrial sites of the South of Market area and many of the City's prosperous residential neighborhoods.

"Dumpville" persisted until 1895 when the police raided the area and removed 150 vagrant scavengers and hobos who called the place home. The San Francisco Call reported: "The great trouble with Dumpville was that it happened to have been located on land belonging to the Southern Pacific and its citizens had no real resources of their own." The railroads complained about the theft of lumber and freight from their yards and warehouses and thus pressure to evict the scavengers and hobos became inevitable./26/

The Decline of Industrial Diversity: The Twentieth Century

By the early 20th century, the industrial diversity of the Project Area declined but Southern Pacific had expanded its facilities, lumber companies increased their presence and warehouse facilities also continued to be a major factor in the area.

The main new business in this area was the Atchison, Topeka and Santa Fe Railway (Santa Fe). Active in Southern California since the 1880s, Santa Fe decided in the 1890s to expand into Central California -- the stronghold of a key competitor, the Southern Pacific Railroad. This decision presented a problem since the logical terminus for Santa Fe's northern branch was San Francisco, a city where the large land area required for an engine terminal and yards were unavailable at an acceptable price. Santa Fe solved this problem by establishing its main engine terminal and yards at Richmond, across the Bay from San Francisco, and leasing Mission Bay land in the eastern part of the Project Area for a freight terminal./27,28/ Consequently, during the turn-of-the-century period, Santa Fe built a seawall around a 24-acre parcel in the China Basin area. This parcel was mostly east of Illinois Street, but also was east of Kentucky Street (now Third Street), north of where Fourth Street meets Third. Santa Fe then filled the area with about four-million cubic feet of rock and other fill. Yards, tracks, freight warehouses, a small roundhouse and a freight ferry slip were then constructed and service began in July 1900./27/

In addition to the Santa Fe development in this area, a number of warehouses for storing oil, agricultural implements, machinery, lime and other items, were built adjacent to the Santa Fe spur tracks along Illinois, Michigan, Georgia, Fourth and Alameda Streets.

The emergence of the California oil industry in the 1890s and the development of hydroelectric power made the State energy self-sufficient by the early 20th century when

Los Angeles supplanted San Francisco as the oil center of California and became the largest oil port in the world./29/ While most of the oil in the Bay Area was refined in the East Bay, mainly in Richmond, large storage facilities were established in San Francisco in the Project Area due to the area's excellent transportation accessibility and the availability of undeveloped land south of China Basin Channel.

Another factor determining the location of oil storage facilities in the Project Area was the connection between Southern Pacific and early oil development in California. In 1919, the Southern Pacific Land Company owned more than 19% of the proven oil land in California and through its controlling interest in the Associated Oil Company, Southern Pacific produced about 18% of the state's oil./30/ Consequently, Associated Oil had a large storage facility in the Project Area, where Southern Pacific was the principal landholder.

Standard Oil Company, a giant of the California oil industry, had oil warehouses and supply tanks between Irwin and Hubbell Streets on the west side of Seventh Street adjacent to the Project Area. The titan of the nation's oil industry in the late 19th century, Standard began producing and refining operations in the West in 1900, when it acquired control of the Pacific Coast Oil Company. Despite an antitrust decision against it in 1911, Standard remained effectively in control of its constituent companies and subsequently became the largest refiner of oil on the Pacific Coast.

Along with the expansion of these major industries, other smaller firms and industries had a major presence in 1913. George Windeler's Cooperage, which manufactured wine casks, barrels, kegs, tanks, and clarifiers for brewers, was located on the north side of Berry Street between Third and Fourth Streets. It was one of the few businesses that survived from the late 1880s until 1913. The Roche Harbor Lime Warehouse Company was located on the south side of Berry Street between Third and Fourth Streets. The California Lime and Hydrate Company was located on what is now China Basin Street near the extended line of El Dorado Street.

The Municipal Pipeyard was located on the east side of Sixth Street about two blocks south of China Basin Channel near Irwin Street. The Pacific Coast Glass Works lay outside the Project Area, west of Seventh Street between Hooper and Irwin Streets.

The Pacific Rolling Mill Company was one of the oldest industries in the area. It began operations in 1868 and was still a flourishing iron and steel factory in 1913./31/ It was located outside the Project Area on the block bounded by 17th, Mariposa, Mississippi, and Texas Streets. The Pacific Refining and Roofing Company, located outside the Project Area, shared the block bounded by 16th, 17th, Texas, and Mississippi Streets with the Pacific Rolling Mill Company.

During the Depression of the 1930s, federal government-funded public works became an important source of both development and employment in California and the Bay Area. In the Project Area, under these programs, two new drawbridges were built across China Basin Channel, which are still standing at Third and Fourth Streets. The Lefty O'Doul Bridge on Third Street is a heel-trunnion bascule iron drawbridge and was built in 1933 by the Straus Engineering Company./32,33/ The Peter Maloney Bridge on Fourth Street was also built in the 1930s, and both bridges have been determined eligible for the National Register of Historic Places./34,35/

Southern Pacific, with its rows of tracks and sheds, continued to occupy the area north of Berry Street in the 20th century. The area south of China Basin Channel, between Sixth and Illinois Streets almost to Mariposa Street, was then crisscrossed by Southern Pacific tracks, relatively few new tracks or buildings were built after 1913. A notable exception was the construction of the China Basin Building bordering the north side of the Channel. Almost the entire block had been previously occupied by the Hauptmann Lumber Company. One block to the north, Southern Pacific displaced the MacDonald Lumber Company with a row of block-long concrete sheds.

Lumber companies were still present near China Basin Channel and steam schooners continued to serve the lumber yards into the 1920s./36/ The Rolando Lumber Company owned most of the block on the north side of China Basin Channel between Fourth and Fifth Streets. Areas on the north and south sides of the channel held lumber storage buildings, but it is not evident who owned those lumberyards or whether they belonged to the remaining lumber companies in the area. On the south side of the channel, three lumber companies were present: between Sixth and Seventh Streets, the Acme Lumber Company and the Holmes Planing Mill Company; and between Fourth and Fifth Streets, the Smith Lumber Company. One block eastward, a newcomer to the Project Area, the United Fruit Company, erected a large L-shaped building.

Along the northwest periphery of the Project Area boundary west of Seventh Street were W.R. Ames Sheet Metal Works, the Pacific Glass Works, the Holmes Lime Company, and the Whittier-Coburn Companies Paint and Oil Works. To the south, west of Seventh Street between Irwin and Hubbell Streets, were the Standard Oil Company of California's warehouse and supply tanks.

As in 1913, the central part of the Project Area remained relatively undeveloped with the exception of Southern Pacific tracks. On the southern boundary there was more development in the area. Southern Pacific's large engine roundhouse was present on the north side of Mariposa Street between Tennessee Street and Pennsylvania Avenue. One block to the east, the Bethlehem Steel Company established a steel depot.

South of Mariposa Street between Iowa and Illinois Streets, outside the Project Area, were several important new businesses including Norwalk Company's oil distribution plant, Crescent Pacific Oil Company, General Petroleum Company, and Hockwald Chemical Company.

In the southeastern section of the Project Area east of Illinois Street (roughly between where 17th and El Dorado Streets intersect Illinois), Associated Oil and Union Oil companies occupied the same premises that they had in 1913. To the north, on the block bounded by El Dorado, Illinois, Alameda Streets, and the Bay, large warehouse facilities had been built, with the China Basin Warehouses occupying the Bay front.

There was a relative lack of new development in the Project Area between 1913 and 1949. It is possible that some temporary development associated with war-related industries, such as shipbuilding and warehousing, may have taken place in the area between Illinois Street and the Bay, but most World War II-related industries developed in other parts of the San Francisco Bay region; in the City, they tended to locate on the waterfront south of the Project Area. The completion of the Bay Bridge in 1936 and the war economy of the 1940s accelerated decentralization of industry away from San Francisco.

Southern Pacific and Santa Fe tracks through or near large areas of undeveloped land may have preempted or discouraged further development. Southern Pacific and Santa Fe did not expand their facilities in this period, reflecting the "automobilization" of America, competition from the trucking industry by the 1940s, and decentralization of industry and freight business in the Bay Area.

IMPACT/37/

POTENTIAL ARCHAEOLOGICAL AND HISTORIC RESOURCES

Major cultural history periods have been discussed on pp. VI.J.1–VI.J.13. The Potential Archaeological and Historic Resources discussion summarizes the overall potential for the occurrence of archaeological sites, features, and structures that relate to those cultural periods. The Potential for Significant Resources discussion focuses on those resources that may be regarded as significant and subject to mitigation requirements under the National Historic Preservation Act or City of San Francisco landmarks preservation guidelines. Impacts on Cultural Resources are described for full build-out of the Project Area in 2020 to reflect worst-case effects on potentially significant resources.

Prehistoric Archaeological Resources

No recorded archaeological sites dating from the Prehistoric (2500 B.C. to A.D. 1500) or Protohistoric (1500s to 1700s) periods are located within the Mission Bay Project Area. The closest recorded resource is about 1,500 feet away. Most of the Project Area lay beneath the waters of Mission Bay during those times. However, three pre-fill land areas on the shore of Mission Bay in the Project Area are regarded as potential locations for prehistoric archaeological sites: the south tip of Steamboat Point, south of the present intersection of Townsend and Third Streets; the north shore of Mission Creek where it entered Mission Bay, southeast of the present intersection of Townsend and Seventh Streets; and the northern end of Point San Quentin, north of the present Mariposa Street, between Pennsylvania Avenue and China Basin Street. The end of Mission Creek (now the westerly end of China Basin Channel) would have consisted of marshlands with less archaeological sensitivity. The Steamboat Point and Point San Quentin areas would be more likely locations for prehistoric habitation and resource gathering encampments.

Although the remainder of the Project Area has a low potential for encountering prehistoric cultural resources, the possibility of encountering prehistoric archaeological sites in this area cannot be totally dismissed./38/ Mission Bay was shallow throughout its existence, and it is possible that very early prehistoric sites (pre-2500 B.C.) may have been located along the perennial Mission Creek drainage in areas which were subsequently covered by Bay waters. Such sites would pre-date the historic configuration of San Francisco Bay and would be of considerable antiquity. The discovery of such a cultural resource would contribute greatly to the understanding of San Francisco's prehistory.

Historic Archaeological Resources

During the 1770s-1860s era, Mission Bay was almost entirely under water and only one known location may have significant deposits of cultural resources dating to these years: the Steamboat Point area, in the two blocks bounded by Third, Fourth, Townsend, and Berry Streets. The main part of Steamboat Point was between Third, Fourth, Townsend and King Streets, but the tip of Steamboat Point extended past the line later formed by King Street and into the Berry, King, Third and Fourth Streets block. The Steamboat Point area consisted of shipyards during the 1850s and early 1860s, and early maps and City directories show various buildings and dwellings in the area during this period. Subsurface remains of Gold Rush period shipyards, building foundations, historic artifacts and trash dumps could be located in that area. Since shipping and shipbuilding were important activities, there is also the remote possibility of encountering undocumented buried ship remains. Also, the presence of a Chinese fishing village near Bryant and Second Streets close to Steamboat Point suggests the possibility of Chinese maritime remains and other artifacts in that section of the Project Area.

During the last four decades of the 19th century, Mission Bay underwent extensive filling and the Project Area developed into a diversified industrial area with a variety of enterprises. Included were shipbuilding, glass-making, chemical manufacturing, lumber production and related industries, railroad operation, a major dump, oil operations and food processing as well as other enterprises. Three types of industries stand out as resulting in potentially significant historic archaeological areas; these are glass-making, shipbuilding and the dump.

By the early part of the 20th century, Mission Bay had been completely filled. Industrial diversity of the area was decreased; industries prominent in the Project Area during the 20th century -- such as oil, lumber and railroads -- were not likely to leave important subsurface cultural resources.

Historic Structures

Previous studies have identified the following buildings or structures as possessing potential historic significance: the Third and Fourth Street Bridges dating from the 1930s, and the cut-basalt block pavement dating from the 1890s on King Street between Third and Seventh, and Sixth south of King Street./39/ In addition, The Foundation for

San Francisco's Architectural Heritage identified several potential historic properties./40/ Those properties were later found to be ineligible for National Register consideration or to have been demolished./41/ Field review revealed little potential for archaeological remains or artifacts at those locations. The basalt block pavement was considered of local historical importance in previous surveys but would not be eligible for the National Register./42,43/

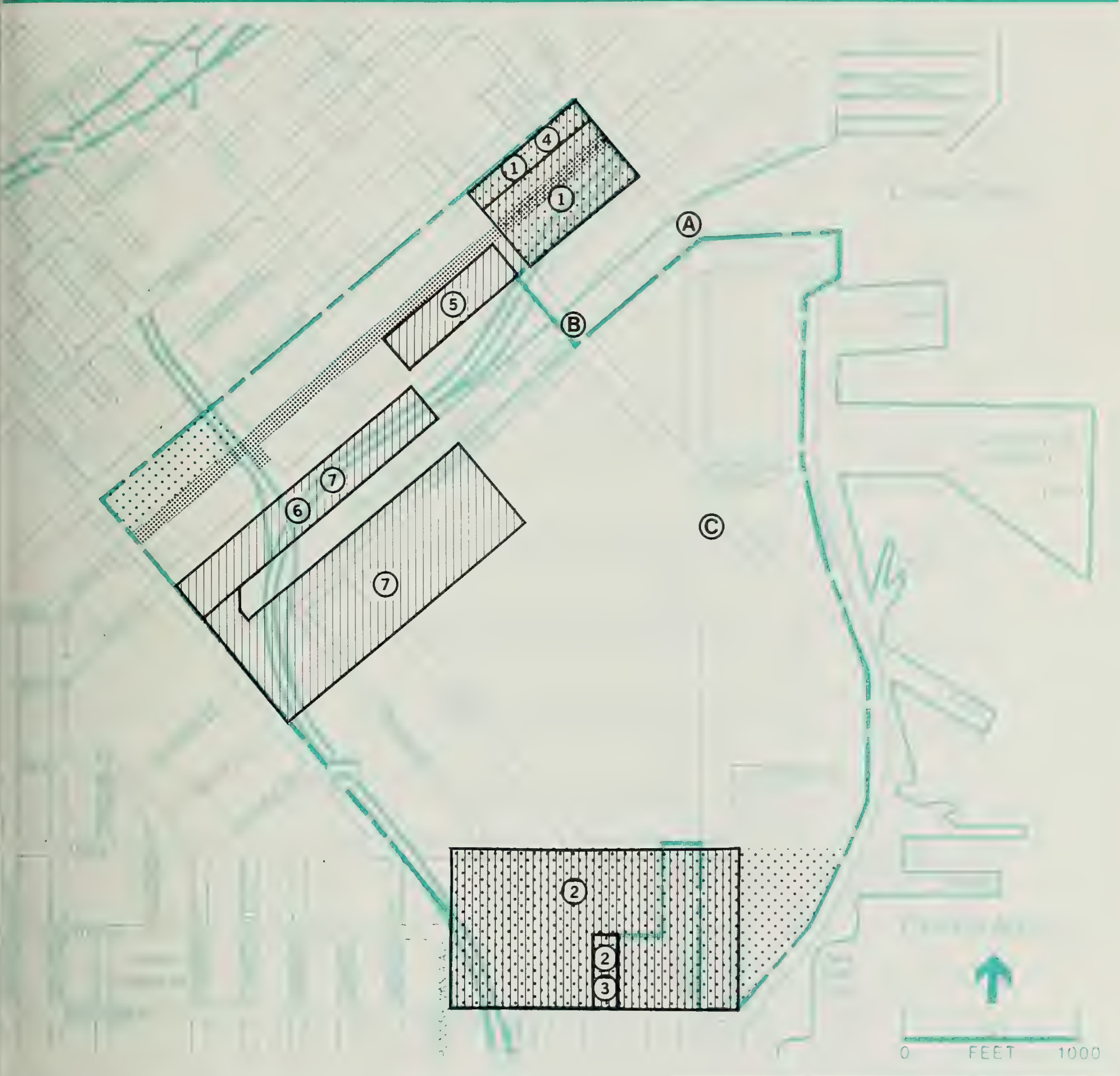
One structure within the Project Area was observed that may be of historical importance: closed Fire Station 30, at the southeast corner of the intersection of Third and Mission Rock Streets; the station may be eligible for listing on the National Register (see VI.I. Architectural Resources and Urban Design, p. VI.I.4). Other existing structures and features in the Project Area are of recent origins and no older than 50 years, generally the required age for structures to be considered by the State Historic Preservation Officer for National Register eligibility (although special circumstances can apply to buildings of lesser age).

POTENTIAL FOR SIGNIFICANT RESOURCES

Mission Bay development may disturb possible cultural resources considered significant under criteria for the National Register of Historic Places. Significant resources are those historic and archaeological properties that are listed on the National Register or are potentially eligible for such listing./44/ Department of Interior regulations describe National Register criteria for listing, and provide the context for impact and mitigation discussions./45/

There is no archival evidence to suggest that prehistoric cultural deposits are actually present at Steamboat Point, Point San Quentin or the end of Mission Creek. Therefore, the potential for impacts on significant prehistoric resources at those three locations is considered to be low (see Figure VI.J.1). The potential for encountering Chinese maritime artifacts near Steamboat Point is also considered to be low. Because of the low potential for encountering prehistoric or Chinese maritime cultural resources in the Project Area, those resources are not discussed further in this impact analysis.

Numerous cultural developments, industries and enterprises and specific activity locations throughout the history of the Project Area are identified on pp. VI.J.4-VI.J.13. Many of the described areas would not contain associated cultural deposits, features or artifacts,



— — MISSION BAY BOUNDARY

▥ POTENTIAL FOR HISTORIC CULTURAL RESOURCES

⁘ POTENTIAL FOR PREHISTORIC CULTURAL RESOURCES

▒ BASALT PAVEMENT BLOCKS

⑦ POTENTIAL RESOURCE AREA (See p. VI.J.18)

Ⓐ LEFTY O'DOUL BRIDGE

Ⓑ PETER MALONEY BRIDGE

Ⓒ CLOSED FIRE STATION 30

ission Bay

FIGURE VI.J.1
CULTURAL RESOURCES POTENTIAL

URCE: David Chavez & Associates

and it is not likely that many of those areas that do contain cultural remains could be regarded as significant historic resources under National Register criteria./45/ However, the areas that may contain potentially significant historical archaeological deposits include:

1. Steamboat Point, a shipbuilding area of the 1850s and early 1860s. Steamboat Point was located in the two blocks bounded by Third, Fourth, Townsend and Berry Streets.
2. Point San Quentin/Point Potrero, another early shipbuilding area, occupied beginning in the early 1860s, defined by 16th Street, Illinois Street, Mariposa Street and Pennsylvania Avenue. This area includes the 1860s to 1880s shipbuilding yards of P.H. Tiernan and the Dickie Brothers at Third and Mariposa Streets.
3. The east side of Minnesota Street between Mariposa and 17th Streets -- the location of the Pacific Glass Works (1863 to 1876).
4. The south side of Townsend Street between Third and Fourth Streets -- the original site of San Francisco Glass Works (1865 to 1870).
5. The block bounded by King, Berry, Fourth, and Fifth Streets -- the second location of the San Francisco Glass Works (1870 to 1886).
6. The south side of Berry Street between Fifth and Seventh Streets -- the area of shipbuilding yards of Alexander Hay and Boole and Beaton (1880s).
7. The area bordered by Berry, Fifth and Seventh Streets, south to where a line extended from Irwin Street would meet Fifth Street -- the City dump from the 1870s to the early 1890s.

Those seven potential historic archaeological locations could be disturbed by land alteration activities (grading, trenching, excavation) for Mission Bay building construction and the removal of the I-280 stub. All Alternatives would involve new construction in areas where historic archaeological deposits are potentially located. Disturbance or removal of soils containing archaeological features and artifacts would destroy the archaeological integrity of the deposits, thus diminishing research potential and the ability of those deposits to yield information important in history.

Construction activities along King and Sixth Streets with all Alternatives would affect the basalt pavement; the architectural integrity and historical importance of Fire Station 30 could be adversely affected by changes in use proposed in Alternatives A and N, or demolition proposed in Alternative B.

BUILD-OUT/2020

Alternative A

By the year 2020, development north of the channel would include the six-block area of office, MHDR, and retail uses bounded by Townsend, Third, Berry, and Sixth Streets, and removal of the I-280 stub that could disturb potential historic archaeological resources at Steamboat Point. Construction in the Townsend, Third, King, and Fourth Streets block could disturb possible archaeological deposits from the 1865 to 1870 San Francisco Glass Works and development in the King, Fourth, Berry and Fifth Streets block could disturb archaeological deposits associated with the second, 1870 to 1886 operation of the San Francisco Glass Works. HDR, open space, and S/LI/RD development bounded by the channel and Berry, Fifth, and Seventh Streets could disturb archaeological deposits associated with 1880s shipbuilding yards of Alexander Hay and Boole and Beaton, and artifacts from the dump. Street improvements on King and Sixth Streets and MUNI-Metro construction on King Street would disturb the basalt pavement.

Housing, open space, and S/LI/RD development south of the channel could disturb historic artifacts from the dump. Dredging and edge improvements along China Basin Channel between Seventh and Fifth Streets could disturb artifacts from the dump. S/LI/RD development in the area bounded by 16th, Illinois, Mariposa, and Pennsylvania Streets could disturb potential archaeological deposits from the 1860's to 1880's Point San Quentin shipbuilding operations, including the yards of P.H. Tiernan and the Dickie Brothers, and from the 1860's and 1870's Pacfic Glass Works.

The rehabilitation and reuse of closed Fire Station 30 as a community facility could affect the building's architectural integrity.

Initial Phase of Development

The initial phase of development could affect potential cultural resources at two locations. Office and retail buildings in the easterly half of the Townsend-Third-King-Fourth Streets block could disturb possible historic archaeological deposits associated with the 1850's and early 1860's Steamboat Point shipbuilding industry and the original location of the San Francisco Glass Works.

Alternative B

Development north of the channel would include the eight-block area of MHDR structures bounded by Townsend, Third, Berry and Seventh Streets, and removal of the I-280 stub. As with Alternative A, construction in the two-block area bounded by Townsend, Third, Berry and Fourth Streets could disturb possible archaeological deposits associated with the 1850s and 1860s Steamboat Point shipbuilding industry. Construction in the Townsend, Third, King, and Fourth Streets block could disturb possible archaeological deposits from the 1865 to 1870 San Francisco Glass Works; and in the King, Fourth, Berry, and Fifth Streets block, possible historic archaeological deposits associated with the second location of the San Francisco Glass Works (1870 to 1886). Road improvements and MUNI-Metro extension on King and Sixth Streets would disturb the basalt pavement.

The proposed open space north of the channel and south of Berry between Fifth and Seventh Streets is the location of late 19th-century shipbuilding operations; grading could disturb possible historic archaeological deposits associated with the 1880s shipbuilding yards of Alexander Hay and Boole and Beaton. Edge improvements along the channel between Seventh and Fifth could disturb artifacts from the dump.

West of Third Street, development would include office, MDR, LDR, and retail buildings north of Hubbell Street and south of Hooper Street. That area is within the southern extension of the 19th-century dump, and construction could impact historic artifacts that might be deposited there. Subsurface work to develop the mid-channel wetland could also disturb artifacts from the historic dump area. MDR, MHDR, community facilities and S/LI/RD development bounded by 16th, Illinois, Mariposa, and Pennsylvania could disturb potential historic archaeological deposits from 1860s shipyards and the 1863 to 1876 Pacific Glass Works.

The construction of a new community facility would result in the demolition of closed Fire Station 30, which may be eligible for the National Register.

Initial Phase of Development

The initial phase of development residential and office construction east of I-280, north of Hubbell Street and south of the channel, could disturb artifacts associated with the southern extension of the 19th-century dump.

Alternative N

Development north of the channel in the area bounded by Townsend, Third, Berry and Fourth Streets could disturb possible archaeological deposits associated with the 1850's and 1860's Steamboat Point shipbuilding operations and the 1865 to 1870 San Francisco Glass Works. Construction in the block bounded by King, Fourth, Berry, and Fifth Streets could disturb possible archaeological deposits from the 1870 to 1886 San Francisco Glass Works. Development in the Berry-Fifth-China-Basin Channel-Seventh area could affect possible deposits from the 1880's shipbuilding yards of Alexander Hay and Boole and Beaton and from the 19th-century dump. The basalt block pavement on King and Sixth would be disturbed as roadways were rebuilt to serve new M-2 development. M-2 development south of the channel west of Third Street could disturb historic dump artifacts. Development in the area bounded by 16th, Illinois, Mariposa, and Pennsylvania Streets could disturb possible archaeological deposits associated with 1860's and 1880's shipbuilding operations and the 1863 to 1876 Pacific Glass Works.

The reuse of closed Fire Station 30 as a community services facility could disturb the building's architectural integrity.

MITIGATION

HISTORIC ARCHAEOLOGIC RESOURCES

With the exception of some limited archaeological testing in the past, very little is known about the actual areal extent, specific nature and location of historic features and artifact caches, and depositional integrity of potential historic archaeological deposits./46,47/ Specific information of that nature is important in determining the actual significance of archaeological resources and in developing appropriate mitigation plans. Pre-construction archaeologic testing and construction monitoring would be appropriate for six of the seven identified historic resource areas; archaeologic monitoring during construction only, rather than testing, would be appropriate for the seventh area, the location of the 19th-century city dump.

Measure	Alternative	Description
J.1	A,B,N	Retain the services of an archaeologist, because of the strong possibility of encountering the remains of cultural or historic artifacts or features in the six historic resources areas. The Environmental Review Officer (ERO) in consultation with the President of the Landmarks Preservation Advisory Board (LPAB) and the archaeologist would determine: 1) whether the archaeologist should instruct all excavation and foundation crews on the project site of the potential for discovery of historic archaeological deposits and artifacts, and the procedures to be followed if such materials are uncovered; and 2) prior to the commencement of foundation excavation, a program of archaeological testing. Retain a qualified historic archaeologist to supervise a pre-foundation excavation testing program for each phase of Project Area development or each construction site, as appropriate, using a series of mechanical, exploratory borings or other testing methods determined by the archaeologist to be appropriate. A qualified historical

Measure	Alternative	Description
		archaeologist would supervise the testing at the site to determine the probability of finding cultural and historical remains. At the completion of the archaeological testing program, the archaeologist would submit a written report first and directly to the ERO and the President of the LPAB, with a copy to the project sponsor, which describes the findings, assesses their significance and proposes appropriate recommendations for any additional procedures necessary for the mitigation of adverse impacts to cultural resources determined to be significant.
		Retain a certified archaeologist to supervise a program of on-site monitoring during site excavation in the six historic resource areas, following site clearance and pre-excavation testing. The certified archaeologist would record observations in a permanent log. Should cultural or historic artifacts be found following commencement of excavation activities, the archaeologist would assess the significance of the find, and immediately report to the ERO and the President of LPAB. Upon receiving the advice of the consultants and the LPAB, the ERO would recommend specific mitigation measures, if necessary. The monitoring program, whether or not there are finds of significance, would result in a written report to be submitted first and directly to the ERO and the President of the LPAB, with a copy to the project sponsor.
		Suspend excavation or construction activities which might damage discovered cultural resources for a total maximum of four weeks over the course of construction at each site to permit inspection, recommendation and retrieval, if appropriate.

Measure	Alternative	Description
		Implement an appropriate security program to prevent looting or destruction, if cultural resources of potential significance are discovered. Any discovered cultural artifact assessed as significant by the archaeologist upon concurrence by the ERO and the President of the LPAB would be placed in a repository designated for such materials or possibly exhibited in a public display. Following approval of the archaeological testing and monitoring program reports by the ERO and the President of LPAB, a final report would be sent to the California Archaeological Site Survey Office at Sonoma State University, the Foundation for San Francisco's Architectural Heritage and the State Office of Historic Preservation. The Office of Environmental Review would receive three final copies of the final archaeological findings report.
J.2	A,B,N	Develop archaeological exploration programs, consistent with measure J.1, above, for pre-identified sensitive historic archaeologic areas that should include the following: – define specific research parameters and prepare a written study plan in consultation with the ERO and LPAB prior to subsurface exploration, with emphasis on National Register determination of historical significance and the maximum retrieval of archaeological data; – examine large-scale exposure of soil profiles; – complete detailed field records, including photographs and drawings, to document subsurface soil profiles, archaeological deposits and integrity of such deposits; and – complete a detailed report of findings to describe research and exploration methodologies, testing results, all archaeological findings and recommendations for resource management.

Measure	Alternative	Description
J.3	A,B,N	Archival review suggests that depositional integrity of the late 19th-century city dump has been lost because of scavenging while the dump was in operation; however, important historical artifacts may still be present. Pre-construction archaeologic testing is therefore not recommended. Archaeological monitoring during construction would be the appropriate mitigation measure for that area. Therefore, retain the services of a qualified archaeologist. The ERO in consultation with the President of the LPAB and the archaeologist would determine whether the archaeologist should instruct all excavation and foundation crews in the area of the 19th-century city dump of the potential for discovery of cultural and historic artifacts or features. If such artifacts or features were uncovered, follow procedures described in J.1 for suspension of construction activities, notification of the ERO and President of the LPAD, and development of recovery measures, as appropriate.
HISTORIC STRUCTURES		
J.4	A,N	Retain an architectural historian to prepare an evaluation of the architectural integrity and historical importance of closed Fire Station 30. If the building were found eligible for National Register nomination or for City Landmark designation, preservation of the architectural integrity and reuse of the building, as proposed in Alternatives A and N, would be carried out consistent with Department of the Interior guidelines for National Register properties, or City guidelines for historic landmarks. The historian would complete a full archival and photographic record of the building.

Measure	Alternative	Description
J.5	B	If the closed Fire Station 30 were found to be eligible for the National Register or for City Landmark designation, demolition of the structure would require additional mitigation measures. Prepare an "Historic American Building Survey", including the precise recording of the structure through measurements, drawings and photographs. Provide sufficient detail in the documentation such that after demolition, the historical structure could be reconstructed from the survey data. File copies of the records and documents with the appropriate federal, state and city agencies. Include in the mitigation program salvage and selective re-use of building materials once the survey is completed. If Station 30 were preserved as part of Alternative B, that could require a realignment of the proposed extension of Fourth Street east of Third. As now planned, that southeasterly extension would require right-of-way through the site of closed Station 30. (See Figure V.2, p. V.14) The realignment would not alter the overall configuration of streets or land uses in Alternative B.
J.6	A,B,N	Leave the cut-basalt pavement on King and Sixth Streets, or portions of it, intact and incorporate it as an historical feature of interest; or remove and store the pavement and use it as road or pathway material in other Mission Bay locations for pedestrian walkway borders, parks or plazas. An alternative measure would be to remove the blocks for later use in other parts of the City; that would be consistent with the San Francisco Department of Public Works policy for historic basalt block pavements./48/

OTHER CULTURAL RESOURCES

Measure	Alternative	Description
J.7	A,B,N	The entire Mission Bay Project Area has at least some sensitivity for the presence of unknown archaeological remains. Prehistoric cultural deposits could be encountered in three identified areas and unknown historical features, artifact caches and debris areas could be located anywhere in the Project Area. Follow procedures for instructing excavation crews, notifying the ERO and President of the LPAB, and developing recovery measures, as described in J.1., above. In addition, in the event that prehistoric archaeological deposits are discovered, consult local Native American organizations. Dialogue with the ERO, LPAB and the archaeological consultant would take place in developing acceptable archaeological testing and excavation procedures, particularly in regard to the disposition of cultural materials and Native American burials.

NOTES

SETTING

/1/ Levy, R., Handbook of North American Indians, Edited by Robert F. Heizer, Smithsonian Institution, Washington, D.C., 1978, Volume 8, pp. 485-595. Linguistic evidence suggests that the immediate ancestors of the historically known Costanoan people moved into the San Francisco region around A.D. 500, and likely migrated from the San Joaquin-Sacramento River Delta area. This theory of Costanoan language arrival into the San Francisco area is chronologically consistent with the appearance of Late Horizon artifact assemblages in archaeological sites in the Bay Area.

/2/ Sharpsteen, W., "Vanished Waters of Southeastern San Francisco: Note on Mission Bay and the Marshes and Creeks of the Potreros and the Bernal Rancho," California Historical Society Quarterly, 1942, 21(2):113-126.

/3/ Dow, G., Bay Fill in San Francisco: A History of Change, Master's Thesis, San Francisco State University, 1973, p. 118.

/4/ Bay Fill in San Francisco: A History of Change, pp. 117-118.

/5/ Bay Fill in San Francisco: A History of Change, p. 119.

/6/ Olmsted, R., N. Olmsted, D. Fredrickson and V. Bente, San Francisco Bayside: Historic Cultural Resource Survey, San Francisco Clean Water Program, 1982, p. 186.

/7/ Young, J., San Francisco: A History of the Pacific Coast Metropolis, Two Volumes, The S. J. Clarke Publishing Company, San Francisco, 1912, Volume 1, p. 37.

/8/ San Francisco Bayside: Historic Cultural Resource Survey, p. 220.

/9/ Langley, H., The San Francisco City Directory, various publishers, San Francisco, 1858 and 1860.

/10/ Wirth Associates, Inc., "Potrero 7 Phase I: Cultural Resources Overview and History," prepared for Pacific Gas & Electric Company, San Francisco, 1979, p. 79.

/11/ Lockwood, C., Suddenly San Francisco: The Early Years of an Instant City, San Francisco, 1978, p. 83.

/12/ Suddenly San Francisco, p. 85.

/13/ Gensoul, A., "Railroad Map of the City of San Francisco," Britton and Company, San Francisco, undated.

/14/ Britton and Company, "Railroad Map of the City of San Francisco," San Francisco Directory, San Francisco, 1864.

/15/ Olmsted, R., N. Olmsted and A. Pastron, San Francisco Waterfront: Report on Historic Cultural Resources, San Francisco Wastewater Management Program, San Francisco, 1977, p. 89.

/16/ The San Francisco City Directory, 1873:17.

/17/ Bay Fill in San Francisco: A History of Change, pp. 129-130.

/18/ San Francisco Waterfront: Report on Historic Cultural Resources, p. 197.

/19/ San Francisco Waterfront: Report on Historic Cultural Resources, p. 95.

/20/ San Francisco Waterfront: Report on Historic Cultural Resources, p. 77.

/21/ San Francisco Bayside: Historic Cultural Resource Survey, p. 191.

/22/ San Francisco Waterfront: Report on Historic Cultural Resources, pp. 57, 62 and 72.

/23/ San Francisco Waterfront: Report on Historic Cultural Resources, p. 58.

/24/ San Francisco Waterfront: Report on Historic Cultural Resources, pp. 92-95.

/25/ Suddenly San Francisco, p. 148.

/26/ San Francisco Bayside: Historic Cultural Resource Survey, p. 224.

/27/ Bryant, K., History of the Atchison, Topeka and Santa Fe Railway, MacMillan Publishing Company, New York, 1974, p. 180.

/28/ Duke, D. and S. Kistler, Sante Fe: Steel Rails Through California, Golden West Books, 1963, San Marino, p. 161.

/29/ Bean, W., California: An Interpretive History, McGraw-Hill Book Company, New York, 1973, p. 373.

/30/ California: An Interpretive History, pp. 372-373.

/31/ Hackett, F., ed., The Industries of San Francisco: Her Rank, Resources, Advantages, Trade, Commerce and Manufactures, Conditions of the Past, Present and Future, Representative Industrial Institutions, Historical Descriptive and Statistical, Payot, Upham and Company, San Francisco, 1884, p. 57.

/32/ Banks, P. "An Evaluation of the Cultural Resources Within the Mission Bay San Francisco Project, City and County of San Francisco, California," prepared for Jefferson Associates, 1983, p. 14.

/33/ Alden, D., "Historic Evaluation of the Third Street Bridge Over Mission Channel Waterway at China Basin, City of San Francisco," City and County of San Francisco Department of Public Works, 1985, p. 13-14.

"The bridge over the China Basin Channel on Third Street . . . has integrity of location, design, setting, materials, workmanship, feeling and association. Rehabilitation work done over the years has had insignificant impact on this integrity.

"It is closely associated with the life of a renowned bridge designer, Joseph B. Strauss, who was heavily involved with the planning of the Golden Gate Bridge at the very time that the Third Street Bridge was being built. The bridge is of (a) type . . . that first brought fame to Strauss and is the only bridge of this type in the immediate vicinity of San Francisco.

"Based on the foregoing, the Third Street Bridge appears to meet the National Register criteria . . . for listing on the National Register of Historic Places."

/34/ Mikesell, S., "Truss Bridge Rating Sheet: Bridge No. 34C-27, San Francisco," Caltrans, Sacramento, 1985.

"The Fourth Street Bridge is the only California example of the Strauss Overhead Counterweight Bascule Bridge, an early design by master bridge designer, J.B. Strauss. It is also the only extant bridge in California constructed by the Thomson Bridge Company, a pioneer San Francisco bridge builder. Historically, the bridge was a key link in the transportation network of the Port of San Francisco."

/35/ Mikesell, S., Caltrans Architectural Historian, Sacramento, telephone conversation, September 17, 1986.

/36/ Olmsted, N., Vanished Waters: A History of San Francisco's Mission Bay, Mission Creek Conservancy, San Francisco, 1986, p. 59.

IMPACT

/37/ The Cultural and Historic Resources impact analysis is based on a report, "Cultural Resources Evaluation for the Mission Bay Project, San Francisco, California," December 1987, prepared by David Chavez & Associates, cultural resource consultants, for Environmental Science Associates, Inc. The Chavez study included archival research at university, state, City of San Francisco, museum and historical society libraries; review of secondary sources previously published on cultural resources of the San Francisco waterfront; historic Sanborn Maps and City directories; contacts with private and public agency historians and archaeologists; and a field reconnaissance of the Project Area.

/38/ "An Evaluation of the Cultural Resources Within the Mission Bay San Francisco Project, City and County of San Francisco, California," 1983, p. 6.

/39/ "An Evaluation of the Cultural Resources Within the Mission Bay San Francisco Project, City and County of San Francisco, California," pp. 13-14.

/40/ Christopher H. Nelson, Architectural Historian, The Foundation for San Francisco's Architectural Heritage, interview, September 22, 1986. Heritage identified the following as potential historic properties: the Southern Pacific engine roundhouse site on the north side of Mariposa Street between Tennessee and Pennsylvania Streets; the Montague Plant building site, which dated from the turn of the century and, as of 1949, was on the northwest corner of Mariposa and Third Streets; and four Southern Pacific freight sheds on King and Berry Streets between Fourth and Sixth Streets. An historical architecture survey of the area for the I-280 transfer concept determined that the sheds were not eligible for the National Register; they were subsequently demolished in 1986. A field review of the Project Area in September 1986 confirmed that no artifacts of the long-demolished Southern Pacific engine roundhouse and the Montague Plant building remain.

/41/ J. Snyder, "Historic Architectural Survey Report for I-280 Transfer Concept," CalTrans, Sacramento, 1983, p. 4.

/42/ San Francisco Waterfront: Report on Historic Cultural Resources, p. 133.

/43/ "An Evaluation of the Cultural Resources Within the Mission Bay San Francisco Project, City and County of San Francisco, California," 1983, p. 33.

/44/ "36 CFR Part 800: Protection of Historic Properties Regulations of the Advisory Council on Historic Preservation Governing the Section 106 Review Process." Advisory Council on Historic Preservation, Washington, D.C., Effective October 1, 1986.

/45/ "Section 106, Step by Step." Advisory Council on Historic Preservation, Washington, D.C., October 1986. "The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that (a) are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that possess high artistic values, or that represent a significant distinguishable entity whose components may lack individual distinction; or (d) that have yielded or may be likely to yield information important in history or prehistory."

MITIGATION

/46/ Wirth Associates, Inc., "Potrero 7 Phase II: Archaeological Test Excavations," prepared for Pacific Gas & Electric Company, San Francisco, 1979.

/47/ Pastron A. et al., "Behind the Seawall." Three Volumes. San Francisco Clean Water Program, San Francisco, 1981.

/48/ San Francisco Waterfront: Report on Historic Cultural Resources, p. 112.

K. GEOLOGY AND SEISMICITY

SETTING

DATA REVIEW AND SITE RECONNAISSANCE

In 1982, during studies for the development of the Mission Bay site, the geotechnical consulting firm of Dames & Moore produced a preliminary report on the site in April, and a more detailed report in December which included the results of limited field work./1,2/ The following year, Harding Lawson Associates / Georesources Consultants did geotechnical analyses on possible stadium sites, several of which are on the Mission Bay site./3/ Data in these reports and other geological studies have been used extensively in this description.

Surface Topography and Geologic Materials

Surface Features

In the 1850s, Mission Bay was a shallow inlet off San Francisco Bay. The original shoreline is shown in Figure VI.N.1, p. VI.N.6 Filling of the site began after the construction of a land-fill bridge (Long Bridge) along the present alignment of Third Street. The northern shore of Mission Bay between Fifth and Seventh Streets was the only officially designated dump in San Francisco during the late 1800s. It was closed in 1895. After the earthquake and fire of 1906, rail lines were extended into the City and the debris hauled to Mission Bay where it was used to fill the area west of Long Bridge. The placement of fill and grading of the surface have left a mostly flat surface with little relief. According to the topographic map of the area, the highest elevation is nearly 20 feet at the extreme southwest corner of the site. Most of the Project Area is below San Francisco datum in elevation./4/

Geologic Structure and Materials

Like most of San Francisco, Mission Bay is underlain by the Franciscan Assemblage, a complex bedrock of ancient ocean floor materials which have been squeezed together and uplifted along the central and northern California coast./5/ The bedrock under the Project Area is composed mostly of sandstone and shale and is the same block exposed on Telegraph Hill. Immediately southwest of the site there is a severely deformed band of rocks which runs from Fort Point through Potrero Hill to Hunters Point. This deformed band, termed a shear zone, is composed mainly of serpentine and melange rocks./6/ Because the rocks from the shear zone dip northeast under the Telegraph Hill block, it is likely that the bedrock in some locations on the site consists of material from the shear zone. Varying thicknesses of younger sedimentary material and artificial fill cover the bedrock on the Project Area.

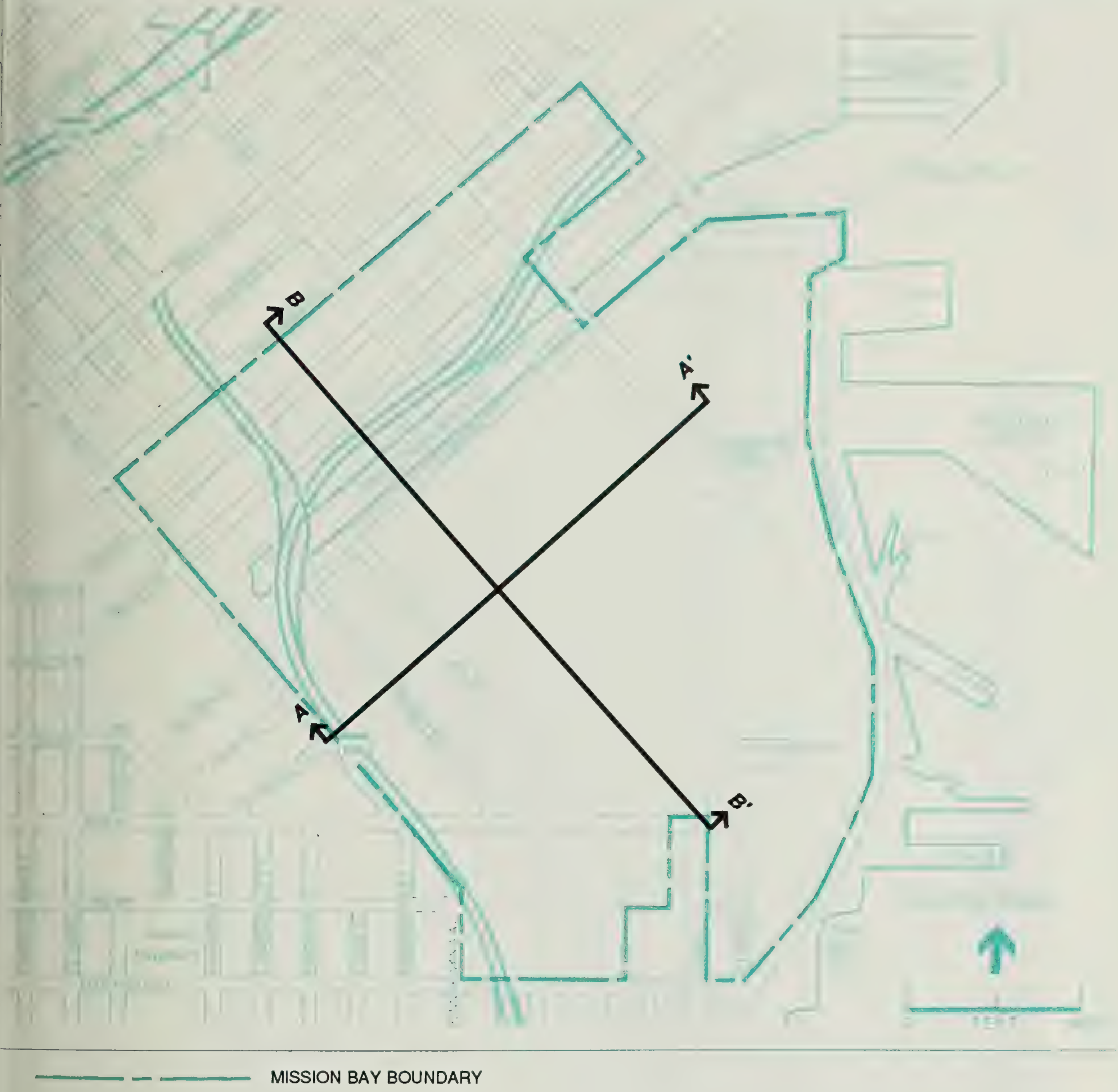
Cores drilled at the site encounter up to five different units of geologic materials. Figures VI.K.1, VI.K.2, and VI.K.3 show subsurface profiles of the Project Area. Starting with the youngest, these units are:

- Fill: Unengineered artificial fill was used to reclaim the property from the Bay, beginning in the mid-nineteenth century. The fill consists of highly variable mixtures of sands with some silts and clays, bricks, cinders, concrete rubble, and trash./1/ The density and compressibility of fill materials are highly variable and their irregular distribution causes large changes in soil behavior over small distances. In some areas behind the China Basin seawall, dredged Bay Mud was used as fill material./3/ The thickness of the unengineered fills ranges from 0 to 57 feet, with an average of 18 feet. Much of this variation is due to the creation of mud waves during the initial filling operations./2/ The nature of these fills also varies substantially within the site from clean sands to rubble. Much of the fill north of the China Basin Channel consisted of old dune sands excavated from local sources; south of the channel the fill is much more varied. In many areas it consists of old rubble, and it is not uncommon in the area to find old wood beams buried in the fill. No direct evidence of the city dump was found by Dames and Moore in any of the 12 borings on the old dump site./2/

- Bay Mud: The youngest bay sediments consist of a soft, uniform, gray, silty clay. It can be divided into two units: an older semi-consolidated member and a younger soft member. The older member is overconsolidated, but not as severely as the old bay clay. In general, both Bay Mud units are high in water content, weak and compressible, but in some locations the older Bay Mud is stiff enough to support piles. Site-specific geotechnical testing is required to determine the engineering characteristics of the older Bay Mud. The younger soft mud is also sensitive; that is, it can suddenly lose up to 50% of its strength when disturbed./7/ Figure VI.K.4, p. VI.K.6, shows isolines (similar to contour lines) indicating the thickness of Bay Mud at Mission Bay, which may be up to 100 feet thick in the central portion of the site./1/ Thickness of the Bay Mud is difficult to determine precisely; the accuracy of the thicknesses shown on Figure VI.K.4 is about ±15 feet./8/

- Sand Deposits: Widespread but discontinuous sand deposits are found underlying Bay Mud. The sand frequently is cut by mud-filled channels./9/ The thickness is highly variable.

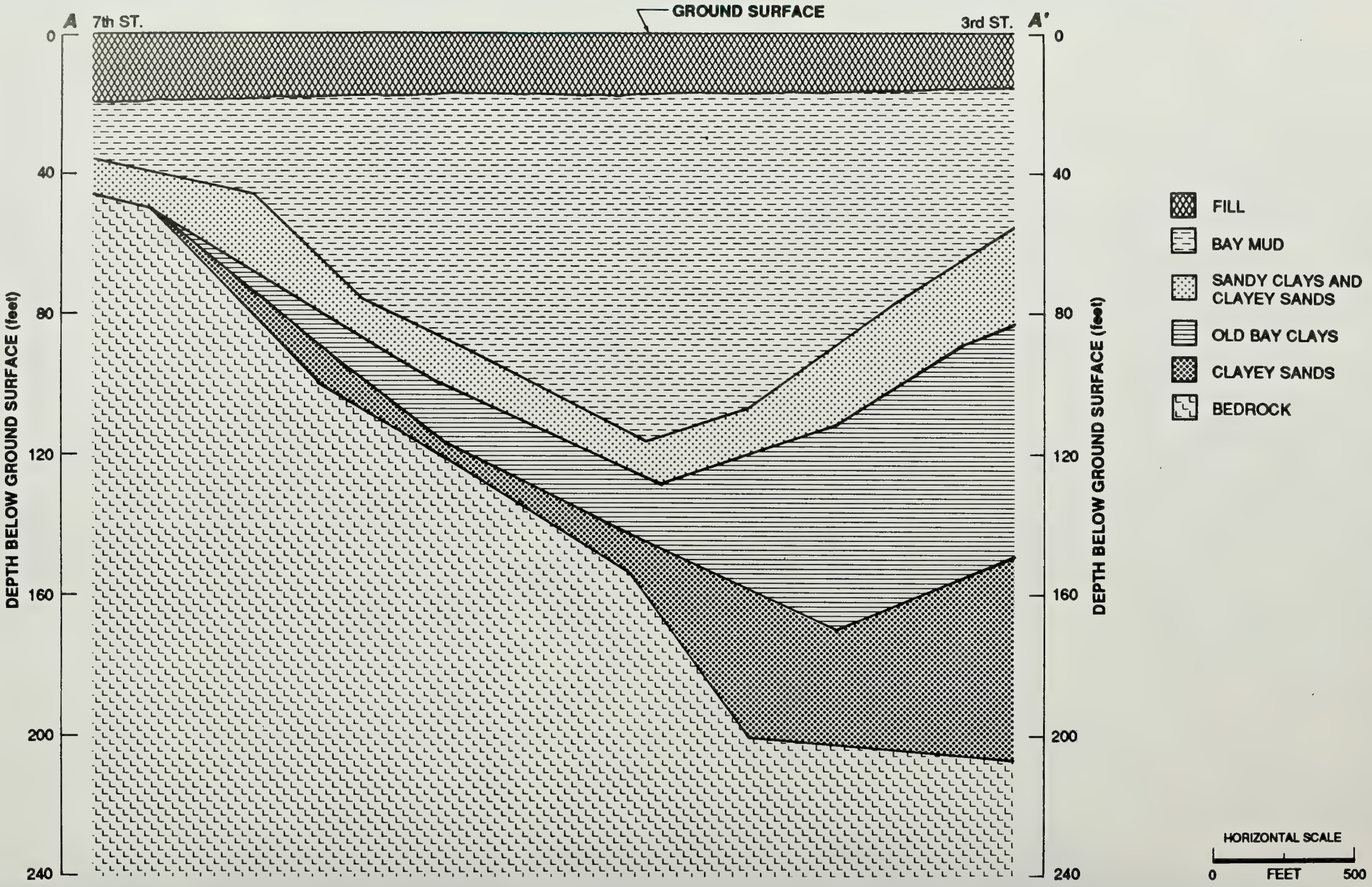
- Old Bay Clay: Old bay clay is a stiff, overconsolidated marine deposit that overlies bedrock./10/ It consists of dark greenish-gray silty clay with some interbedded sand layers./7/ In some locations it is underlain by dense clayey


B
A'
A
B'
MISSION BAY BOUNDARY

Mission Bay

FIGURE VI.K.1
PLOT PLAN SHOWING LOCATIONS OF SUBSURFACE PROFILES

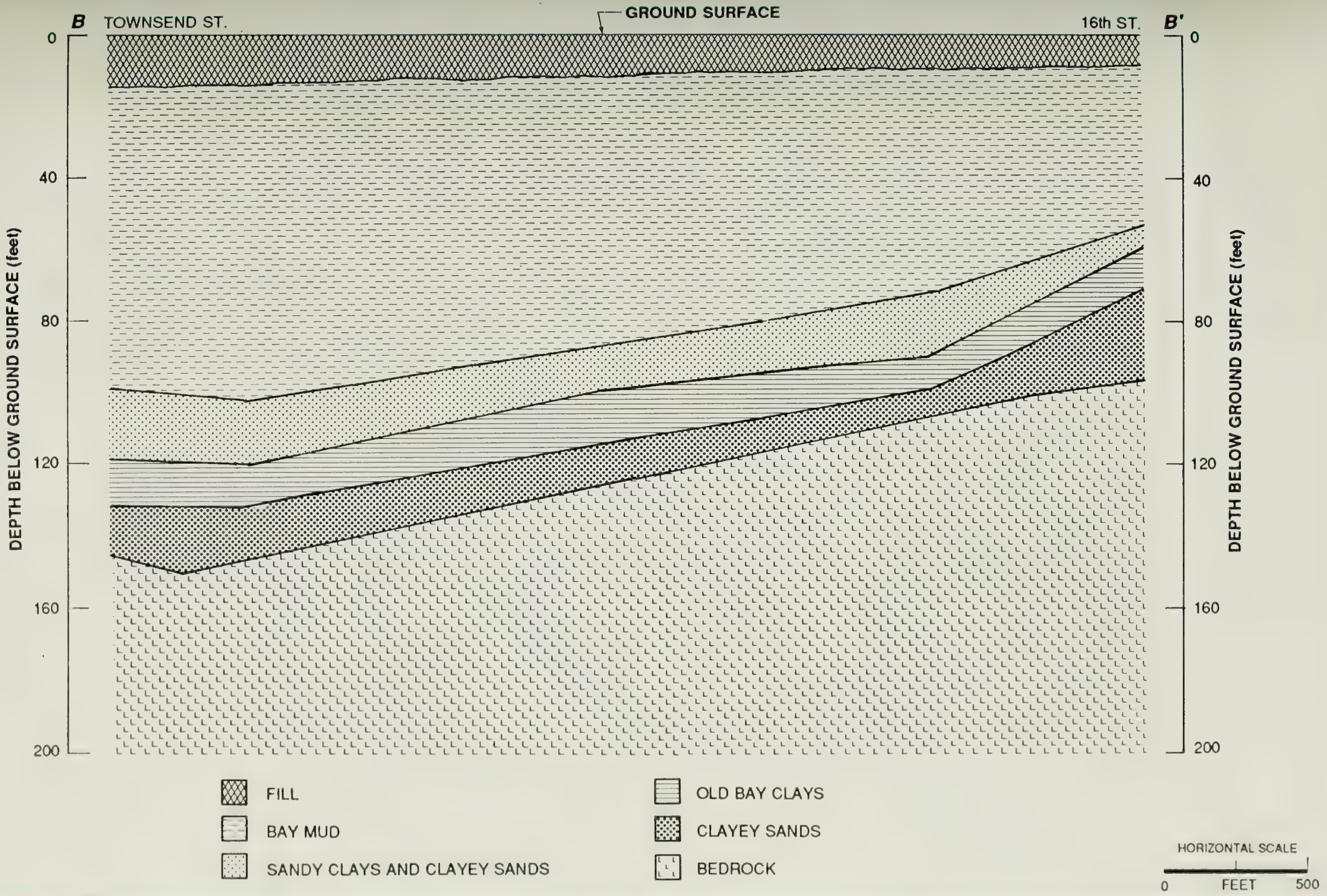
SOURCE: Dames & Moore


A
7th ST.
GROUND SURFACE
3rd ST.
A'
DEPTH BELOW GROUND SURFACE (feet)
0
40
80
120
160
200
240
FILL
BAY MUD
SANDY CLAYS AND CLAYEY SANDS
OLD BAY CLAYS
CLAYEY SANDS
BEDROCK
HORIZONTAL SCALE
0
FEET
500

Mission Bay

SOURCE: Dames & Moore

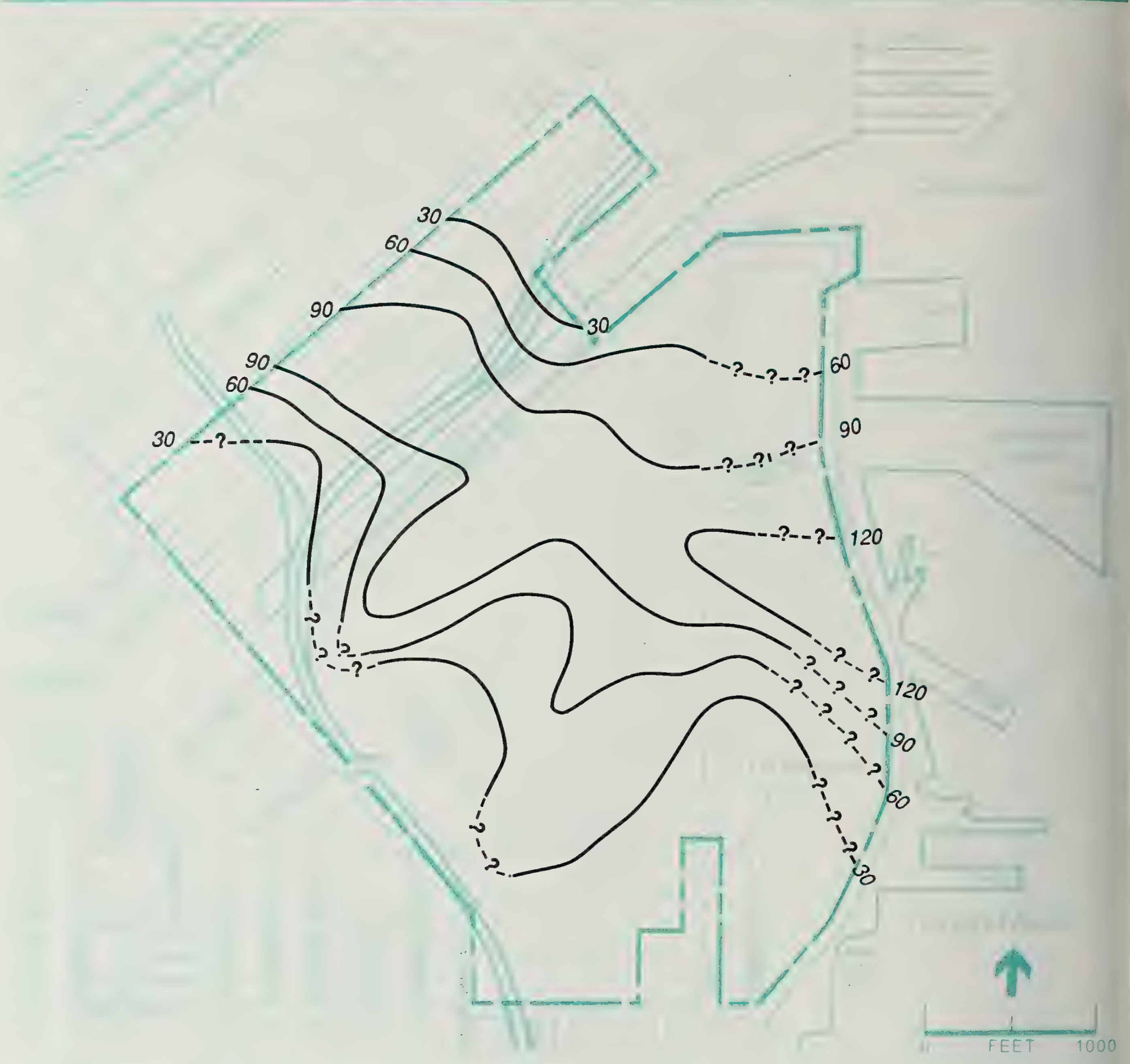
FIGURE VI.K.2
SUBSURFACE PROFILE
ALONG SECTION A - A'


B
TOWNSEND ST.
GROUND SURFACE
16th ST.
B'
DEPTH BELOW GROUND SURFACE (feet)
0
40
80
120
160
200
FILL
BAY MUD
SANDY CLAYS AND CLAYEY SANDS
OLD BAY CLAYS
CLAYEY SANDS
BEDROCK
HORIZONTAL SCALE
0
FEET
500

Mission Bay

SOURCE: Dames & Moore

FIGURE VI.K.3
SUBSURFACE PROFILE
ALONG SECTION B - B'


30
60
90
90
60
30
30
60
90
120
120
90
60
30
FEET
1000

MISSION BAY BOUNDARY

30 THICKNESS OF BAY MUD IN FEET

---?--?--?--?--?-- PROJECTED THICKNESS OF BAY MUD

Mission Bay

SOURCE: Dames & Moore

FIGURE VI.K.4
THICKNESS OF BAY MUD

sands./1/ The old bay clay may be more than 200 feet thick in the middle of the San Francisco Bay, but along the margins of the Bay this unit may be missing./9/ At Mission Bay, the maximum thickness of the old bay clay is about 110 feet./1/

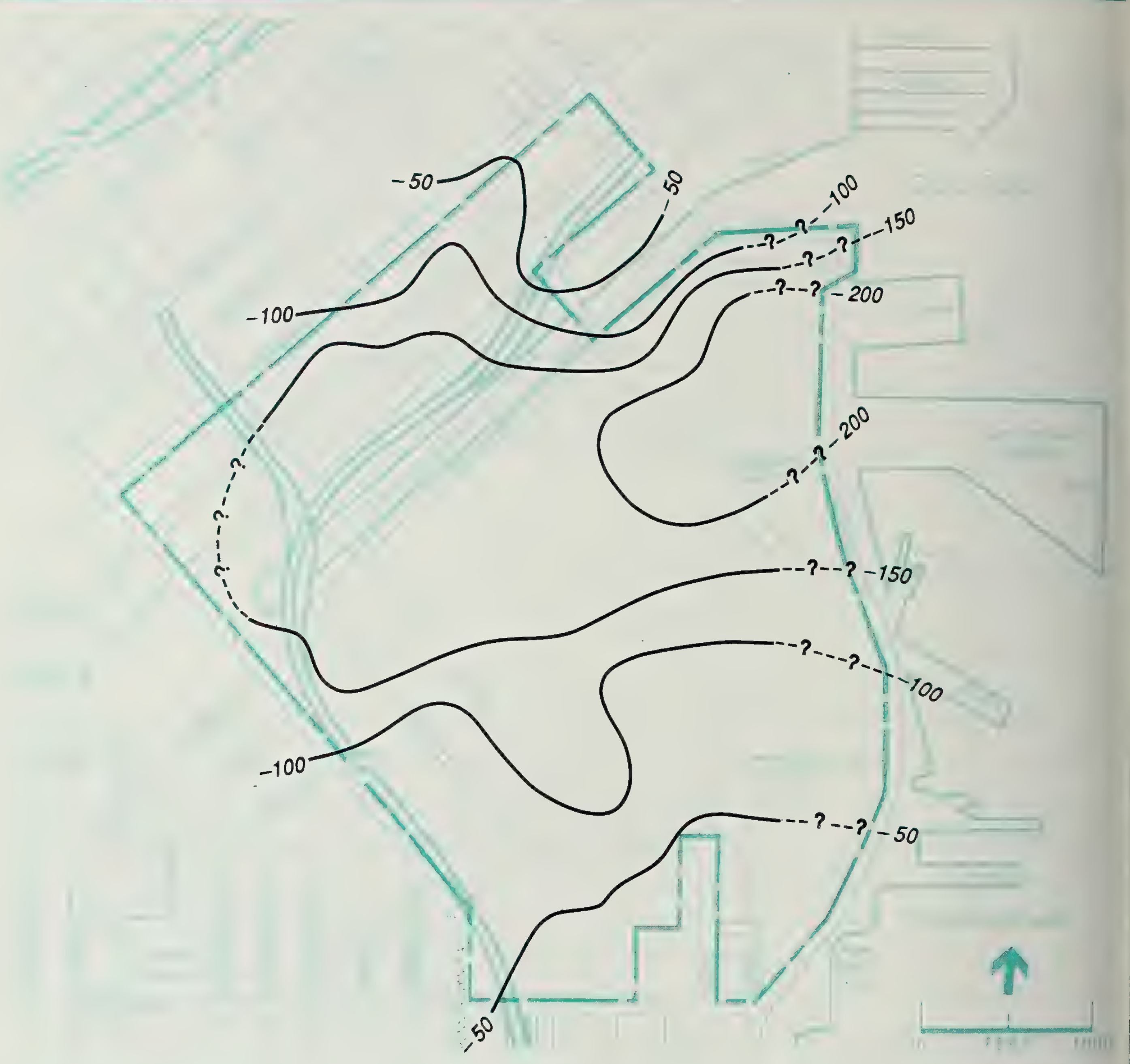
- Franciscan Assemblage: The Franciscan Assemblage, bedrock at Mission Bay, is a widely distributed rock group which contains a variety of rocks formed on the ocean floor and subsequently deformed by large-scale geologic processes. The depth to bedrock is shown in Figure VI.K.5. It varies from 0 to more than 200 feet below San Francisco City datum. At Mission Bay the Franciscan Assemblage is represented by only three major rock types: melange, serpentine and a dirty gray sandstone known as graywacke. Before deposition of the younger sedimentary material on it, the Franciscan bedrock was exposed in a surface with considerable relief and deep weathering./7/ It is, therefore, not a flat solid surface at depth, but a steeply sloping, irregular surface which has been buried.

Geologic Site Development Constraints

Settlement

The most compressible materials occurring on the site are unengineered artificial fill and Bay Mud. These materials are found on most of the site although the exact placement is unknown at this time. Settlement of several feet has occurred since unengineered fill was placed on the site beginning in the last century and settlement will continue, although at a decreasing rate. If no additional load from fills or structures with shallow foundations is placed on the site and the groundwater level does not change, the amount of settlement over the next 30 years is expected to be less than two inches where the Bay Mud is no more than 60 feet thick, less than six inches where the Bay Mud is 70 to 90 feet thick, and up to one foot where the Bay Mud is more than 90 feet thick./2/ Zones of expected settlement under existing conditions are shown in Figure VI.K.6, p. VI.K.9. The amount and pattern of future settlement may be significantly influenced by the presence of existing rubble and trash fill.

Differential settlement on the site is a likely problem because the fills have variable compressibility, the amount of settlement depends on the thickness of the Bay Mud which varies over the site, and because of structures and piles which have been placed on the site. Warehouses are common on the site and there are numerous places where fill has been placed to raise the ground level to the height of loading docks. These fills, known as dock height fills, are about four feet higher than the existing grade and are additional weight which accelerates the rate of settlement and increases the amount of settlement. Dock height fills are shown in Figure VI.K.6. If the fill has been removed, then the


-50
50
-100
-150
-100
-200
-200
-150
-100
-100
-50
-50
0
FEET
1000

MISSION BAY BOUNDARY

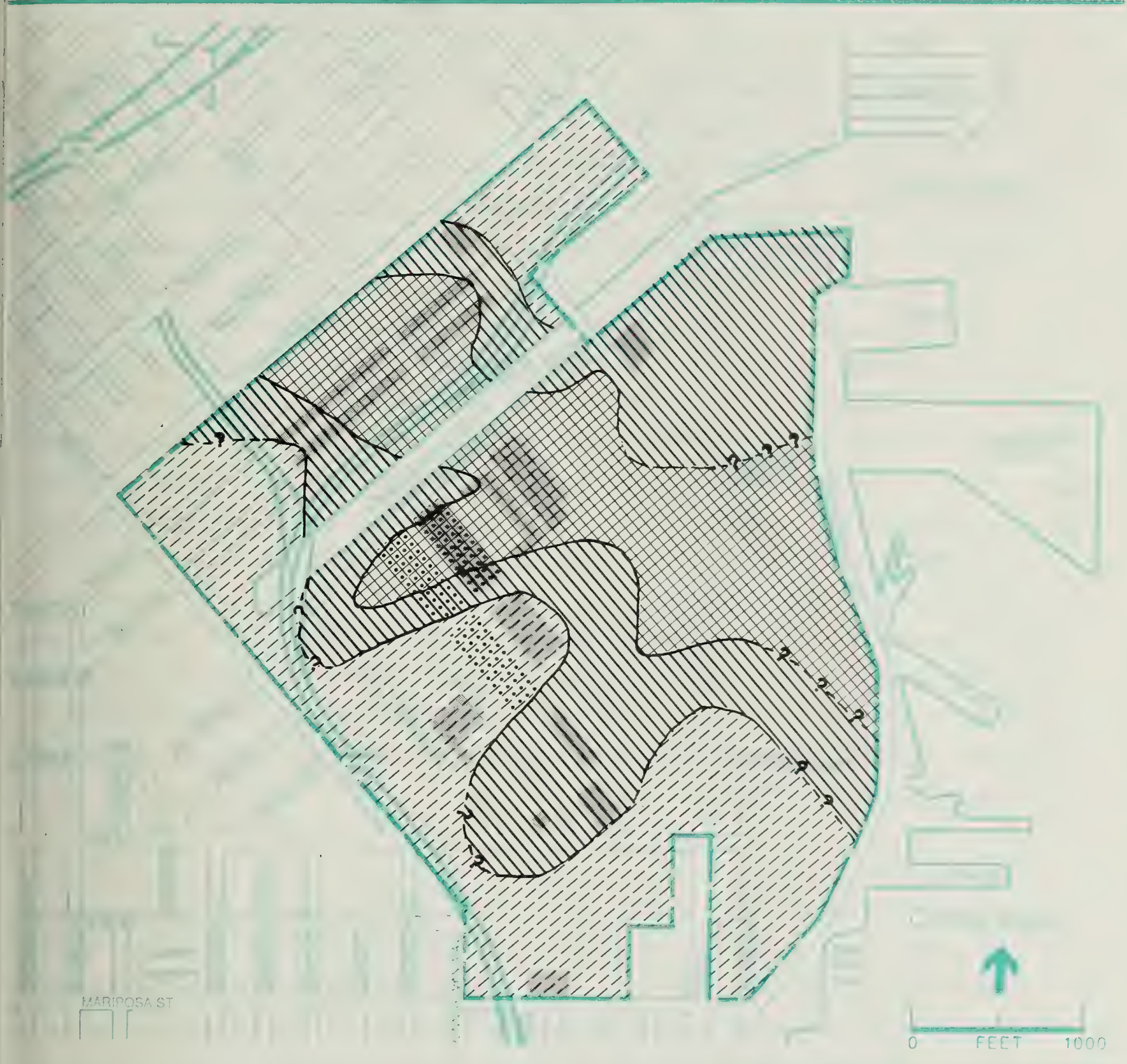
– 50 TOP OF BEDROCK CONTOURS IN FEET (S.F. CITY DATUM)

---?--?--?--?--?-- PROJECTED CONTOUR

Mission Bay

FIGURE VI.K.5
BEDROCK CONTOURS

SOURCE: Dames & Moore



— — — MISSION BAY BOUNDARY

▨ Less than 2 in. expected settlement of existing fills in next 30 years

▧ 2 in. to 6 in. expected settlement of existing fills in next 30 years

▦ Greater than 6 in. expected settlement of existing fills in next 30 years

▩ Known existing or razed pile-supported structure

⁙ Existing dock height fill

Mission Bay

SOURCE: Dames & Moore

FIGURE VI.K.6
EXPECTED SETTLEMENT IN NEXT 30 YEARS, DOCK HEIGHT FILLS AND PILE-SUPPORTED STRUCTURES

underlying mud has been preconsolidated and will settle less when reloaded than it would if it had not previously been loaded./2/

There are a number of structures on the site that are supported on piles. These include I-280 support structures, some buried storm drains and sewer lines, and some older buildings./11/ At least six pile-supported structures are known to have been removed with the piles left in place: the engine pits near the old roundhouse north of Mariposa Street, a warehouse along the channel in the "Banana Triangle" area, and the four freight sheds south of King Street. There are probably other existing or removed pile-supported structures which are not recorded and are not listed here. Locations of some pile-supported buildings are shown in Figure VI.K.6, p. VI.K.9. The presence of piles creates a "hard" spot which would provide firm support for new structures. However, a "soft" spot, which is difficult to repair, is created if the piles are pulled./2/

In summary, the varying thicknesses of unengineered fills and the highly compressible Bay Mud, the uneven distribution and heterogeneous nature of the fills, and the presence of piles and dock-high fills make settlement a constraint on building and foundation design at the site. Even if structures are pile supported, continuing settlement of the present ground surface will occur.

Ground Failure

If a load, such as a large building, is applied too quickly to the weak Bay Mud, the ground may suddenly fail and cause underlying mud to be squeezed up around the loaded area. This occurs when the mud is loaded so rapidly that the water in the pores between the particles of clay cannot escape quickly enough to allow for compression. Normally failure will occur soon after a load is placed on the mud.

Mud Waves

In areas where the mud is unconfined laterally, like around the bay margins or along a channel, loading can cause the mud to squeeze out into the unconfined areas. This has occurred along the sea wall in San Francisco, at the Bay Bridge Toll Plaza and on the north shore of Hunters Point. In each case, fill placed on the mud has caused mud waves to heave up into adjacent unconfined, unloaded areas./12/

Ground Water Level

Ground water conditions on the site have been evaluated by Dames and Moore using information from pre-existing and new boring logs. The ground water table is equivalent to mean water level in San Francisco Bay, which is approximately -8.6 feet San Francisco datum./2/ It may be as much as a foot higher in the winter due to infiltration of rain water. In areas where porous fill materials are hydraulically connected to tidal water, the ground water level would rise and fall with tidal action.

Seismic Hazards

Faulting and Earthquakes

No active faults are known to exist within San Francisco. Several active faults are nearby and could affect existing and proposed structures at Mission Bay./13/ The active faults include the San Andreas Fault, about nine miles southwest of the site; the Hayward Fault, about 10 miles northeast of the site; the Seal Cove-San Gregorio Fault, about 20 miles west of the site; and the Calaveras Fault, about 22 miles east of the site. These faults are shown in Figure VI.K.7.

Both the San Andreas and Hayward Faults have histories of earthquake activity. Studies of seismicity in California and other areas where major tectonic plates meet indicate that comparatively higher levels of seismic activity occur before great earthquakes, but diminish afterward; that is, there is an historic pattern of large and major earthquakes clustering before a great earthquake. After the 1906 earthquake, there was a long quiescence in seismic activity until the mid-1950's. Since that time there has been continuing seismic activity in northern California which "suggests that the San Francisco Bay Area is entering an active stage of the cycle during which major earthquakes can again occur."/14/ Estimates of the probability of a major earthquake during the next 20 years on the San Andreas Fault or the Hayward Fault range from 2% to 14% near San Francisco; the probability is graphically shown on Figure VI.K.7./14/ An earthquake on the Calaveras Fault could have a shock of up to magnitude 7.3 on the Richter scale./15/ Several small and moderate earthquakes, comparable to the 1957 Daly City earthquake (Richter 5.3), also may be expected to affect the site./16/

Several inactive faults existing within San Francisco are not likely to cause earthquakes and more distant active faults would not create significant hazards in San Francisco./17/

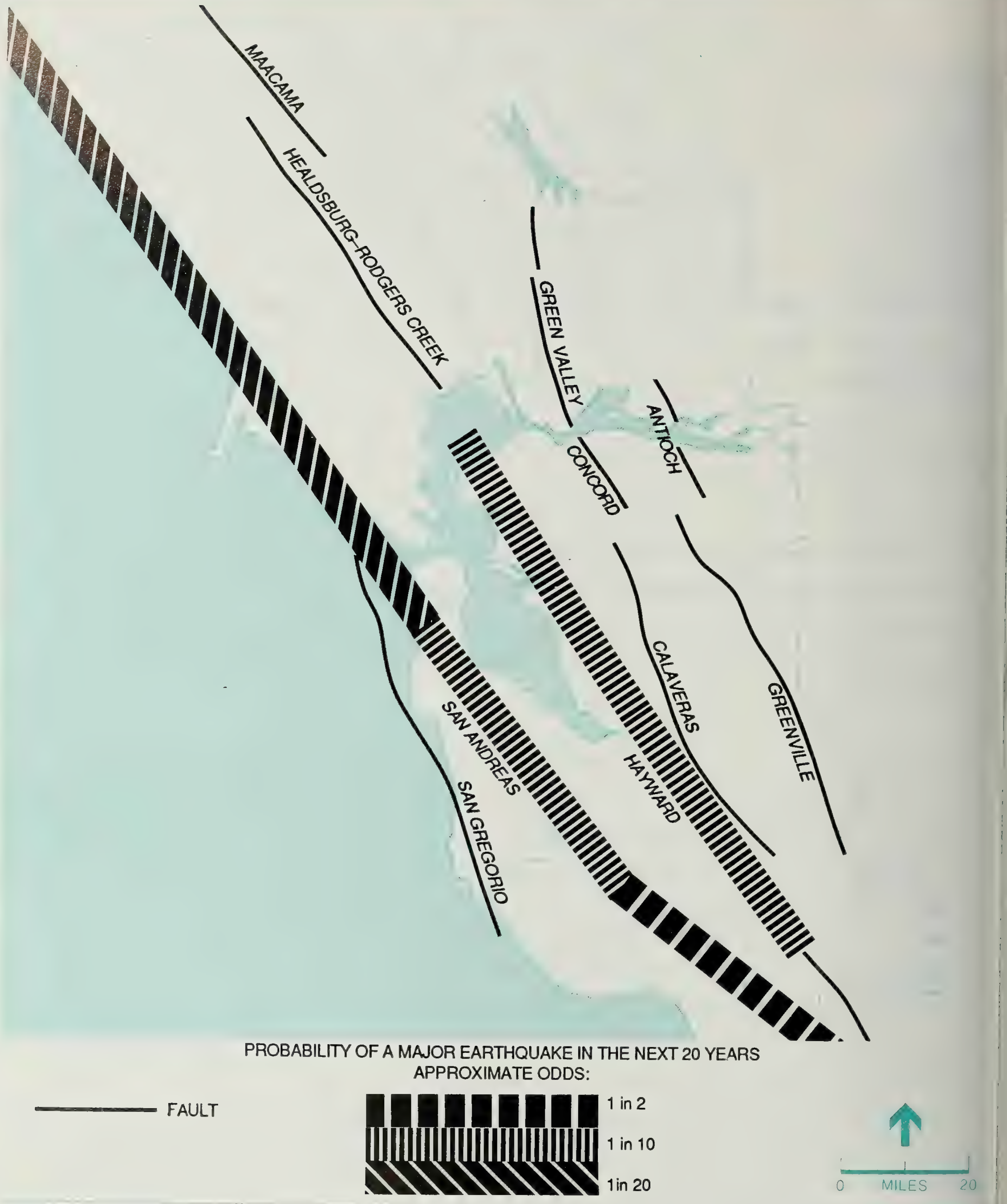

MAACAMA
HEALDSBURG-RODGERS CREEK
GREEN VALLEY
ANTIOCH
CONCORD
CALAVERAS
GREENVILLE
SAN ANDREAS
HAYWARD
SAN GREGORIO
PROBABILITY OF A MAJOR EARTHQUAKE IN THE NEXT 20 YEARS
APPROXIMATE ODDS:
FAULT
1 in 2
1 in 10
1in 20
0
MILES
20

FIGURE VI.K.7
MAJOR BAY AREA FAULTS

SOURCE: Real, 1984, Probabilistic Long-Term Forecasts of Major Earthquakes in the San Francisco Bay Region

Groundshaking

Groundshaking intensity throughout the Project Area is likely to be violent due to a magnitude 8.4 earthquake on the San Andreas Fault./18/ A magnitude 6.9 earthquake on the Hayward Fault would cause very strong groundshaking in the Project Area./19/

Groundshaking intensity at a particular location is strongly affected by the underlying geologic materials./20/ Thick, poorly consolidated soils tend to amplify and prolong the shaking. In San Francisco, the soil most susceptible to shaking is Bay Mud./19/ Miscellaneous uncompacted fill materials such as sand and rubble, likely to be found in parts of the Project Area, are expected to perform poorly. Subsurface conditions will strongly influence the character of ground motions resulting from an important seismic event. There are vertical and horizontal movements during groundshaking and the motions in different directions may have quite different characteristics.

The State Commission that investigated the 1906 earthquake summarized damage caused in April 1906 to the City as a whole./21/ It indicates the relative susceptibility to earthquake damage of the Project Area.

> "To some extent the earthquake caused damage to buildings and other structures in all parts of the city and county of San Francisco. The whole area was decidedly within the destructive zone. Still, over a large part of this area, far the larger part, the damage was slight both in amount and character. Almost everywhere chimneys were thrown down or badly broken, but in a few small localities most of the chimneys withstood the shock. Some probably were unhurt. Plaster on walls and ceilings was very generally damaged. So, probably, were frail partition walls and chandeliers, crockery and fragile household furnishings. Such effects were typical of large sections of the city. There were relatively small districts, however, in which brick and frame buildings of ordinary construction were badly wrecked or quite destroyed. Pavements were fissured, buckled, and arched. Sewers and water-mains were broken. In places, portions of streets were moved laterally several feet out of place. Well-ballasted street-car tracks, equipped with 8, 10, or 11 inch rails, were arched and flexed or thrown into shallow wave forms. The whole land surface, sometimes for several blocks together, was deformed into shallow waves of irregular extension, length, and amplitude. Effects of this degree of violence were pretty closely confined, as has been stated already, to areas of "filled" or "made" land. Such characterize, therefore, only a small portion of the city . . ."

Observations of damage recorded by the State Commission describe damage to the part of the Project Area north and west of China Basin Channel as follows:/21/

> "This is one of two localities in the city, the other being a "made" land tract along the former course of Mission Creek, in which destructive effects of great

> magnitude were conspicuously developed. Only in very close proximity to the fault was greater violence manifested. For blocks the land surface, paved streets, and building plots alike, were thrown into wave forms, trending east and west about parallel to the length of the area. The amplitude and wave-length of these earth billows, and the distances to which they extend, are indefinite and irregular. . . . This slumping movement . . . was greatest near the center, or channel, where the street lines were shifted eastward out of their former straight courses, by amounts varying from 3 to 6 feet. . . .
>
> "The greater part of the district was occupied by wooden dwellings and shops, with a small percentage of mediocre brick buildings and a few of substantial construction. The fire swept the area clear. Not even heaps of debris remained to cover the ground, most of the destructive effects being obliterated, along with the structures in which they were developed. . . ."

In discussing the area south of China Basin Channel, some of which had been filled by 1906, the Commission report provides the following description:/21/

> "The space formerly occupied by Mission Bay has been partly filled to provide building sites, and of course the materials used in filling were deposited in water. The district is occupied in part by structures of great strength, such as railway tracks; in part it is devoid of buildings. Thruout the district, evidence was insufficient and inconclusive. Except near the former outlet of Mission Creek, and in the area further north formerly occupied by the tidal marsh, the destruction produced does not denote intensity higher than Grade C."

In an earthquake of the magnitude of the 1906 earthquake, "virtually every building [in San Francisco] would be expected to have some damage visible to a trained observer"./22/ In addition, groundshaking from large, major or great (Richter magnitude 5.5 - 8.5) earthquakes in the Bay Area could topple unattached interior objects such as stacked items in warehouses, and break and dislodge some windows or exterior panels.

The Commission, summarizing damage to San Francisco which was caused by the 1868 Hayward earthquake, stated that buildings on "made ground" suffered the most damage. In general, effects were similar to those caused by the 1906 earthquake, although less well documented. No tidal wave (tsunami) accompanied the earthquake, but a seiche developed in Laguna Honda, a natural water body located about 2.5 miles west of Valencia and Market Streets./21/

Ground Failure/23/

Except for the northern corner of the Project Area near Third and Townsend Streets and a small area in the southwest corner where bedrock is near the surface, the Project Area has potential hazards of subsidence, liquefaction and lateral spreading. The Project Area is particularly susceptible to liquefaction because abundant sand lenses and layers are located below the shallow water table. In 1906, liquefaction and rapid subsidence caused buildings to settle and crack, and water mains, pipes and underground utilities to break in areas along the waterfront that were constructed on fill. Local streets could buckle or crack from lateral spreading that might accompany liquefaction or rapid subsidence. Buildings that would likely receive the greatest damage from ground failure include older structures with poor foundations.

Large modern structures generally are founded on pilings driven into more solid materials at depth or on thick concrete slabs that "float" on a layer of engineered fill or on layers of soil beneath those most susceptible to failure. Both of these foundation types are engineered to support the structure in the event of seismic ground failure.

Tsunami and Seiches

Tsunami are sea waves produced by a large-scale, sudden disturbance on the ocean floor. Submarine earthquakes are the most common cause, but tsunami also result from underwater landslides, subsidence or volcanic eruption. The waves are fast-moving and of low amplitude in the open ocean, although they may pile up suddenly as they enter shallow coastal waters./24/

The 1906 earthquake apparently did not generate tsunami./21/ Predictions of tsunami runup for the San Francisco Bay Area are given in several publications but there remains considerable uncertainty over the extent of tsunami runup which would occur in the Project Area./22,25,26/

A seiche (pronounced saysh) is a rare oscillation of the surface water in an enclosed basin, such as a bay or lake, caused chiefly by local changes in atmospheric pressure aided by winds or by an earthquake. The most likely generating mechanism for a seiche in San Francisco Bay is motion along one of the major faults in the Bay Area. The seiche generated by the 1906 earthquake caused several oscillations of one to two inches. The period of recurrence was 40 to 45 minutes./21/ Based on this historic occurrence, a major earthquake is not expected to cause a destructive seiche in the Bay.

CITY AND COUNTY SEISMIC SAFETY MEASURES AND POLICIES

The Community Safety Element of the Master Plan contains four objectives that highlight seismic safety and emergency preparedness directives.

- Objective 1, "Reduce hazards to life safety, minimize property damage and economic dislocations resulting from future earthquakes," would require geologic or soil engineering site investigations and modification of land uses and/or structures throughout the Project Area consistent with acceptable risk levels.

- Objective 2, "Preserve, consistent with life safety considerations, the architectural character of buildings and structures important to the unique visual image of San Francisco," encourages renovation and structural reinforcement of significant structures. In the Project Area, this objective would apply to the brick firehouse located near the intersection of Third, Fourth, and Mission Rock Streets and the Third and Fourth Street Bridges./27/

- Objective 3, "Ensure the protection of life and property from the effects of fire or natural disaster through adequate emergency operations preparation." To respond to this objective, the Mayor's Office of Emergency Services (OES) promotes emergency response planning for individual buildings and areas, coordinating the involved agencies. This objective is met by planning and coordination among City agencies. It can be more effective if Objective 1 is carefully implemented. For the Project Area, locations of access routes are of particular concern for emergency planning.

- Objective 4, "Assure the sound and rational reconstruction of San Francisco following a major disaster," applies to the entire City. The behavior of structures and geologic materials in a major earthquake can provide valuable insight for improving seismic design standards. Design and code changes should be applied to rebuilt structures and necessary changes in land uses should be made based on the performance of structures in a major earthquake.

Office of Emergency Services

The Mayor's Office of Emergency Services (OES) coordinates planning to provide an effective integrated response to emergencies of all kinds. It deals with the emergency management system, operational and organizational policies, procedures and emergency response for earthquakes and other disasters (e.g., flood/tidal wave, fallen aircraft, and chemical accidents). It promotes and reviews emergency response planning for individual buildings and areas. The OES guides the development and updating of the city's Basic Emergency Operations Plan, which generally defines the emergency organization of the City and County of San Francisco and assigns general responsibilities to the departments and agencies that comprise the emergency organization. It also provides the organizational procedures and actions to be followed by hospitals, all City departments and agencies, including the Police and Fire Departments, as well as state and federal actions, during the first few days of a disaster. Lifeline and emergency services such as utilities, phones, the American Red Cross, Salvation Army and volunteer organizations concerned with minimizing the effects of a disaster are coordinated by OES. The San Francisco Earthquake Response Plan supports the Basic Emergency Operations Plan./28/

In the event of a disaster, the Mayor of San Francisco would control and direct the emergency services of San Francisco as the Commander of Emergency Services. Central control would be exercised from the primary Emergency Operating Center at 1003 Turk Street. All city employees, as members of the Emergency Services organization, would be under the direction of the Commander of Emergency Services. The OES would serve as a coordinating link in the lines of communications and authority between the City and County of San Francisco and the California State Office of Emergency Services and the Federal Emergency Management Agency./28/

Under the City's Emergency Operations Plan, prepared under the guidance of the OES, San Francisco is divided into ten Emergency Operations Districts, generally corresponding to the city's ten Fire Battalion Districts. The Mission Bay Project Area is completely within District 3. The primary emergency operations headquarters for District 3 is located in Fire Station 8 at 36 Bluxome Street. The primary Mass Care Facility is located at Potrero Hill Middle School, 55 Deharo at 18th Street./29/ The primary Casualty Care facilities are located at San Francisco City Clinic, 250 4th Street and at South of Market Health Center, 551 Minna. The primary Multi-Purpose Staging Area is located at the Hall of Justice, Bryant Street, as is the emergency (helicopter) personnel pickup & landing point./30/ These facilities are subject to earthquake damage, but they are generally above average in structural integrity when compared to other structures that could be used to house emergency services./28/ The Jackson Playground, at 17th Street and Carolina Avenue, could be used as a long-term, temporary housing site.

Seismic Investigation and Hazard Survey Advisory Committee (SIHSAC)

The San Francisco Building Code, Section 204.1B, establishes the Seismic Investigation and Hazard Survey Advisory Committee (SIHSAC) which consists of engineers, geologists and seismologists to keep the Board of Examiners and the Board of Supervisors apprised of updated seismic hazard information and to review and recommend engineering and planning criteria necessary to reduce seismic hazards.

The concerns of SIHSAC and city agencies include the issues of seismically induced soil failure such as liquefaction, settlement and lateral spreading; surface rupture, ground shaking, tsunami, and seiche; seismic design criteria for structures, including siting, foundation type, construction quality assurance and control; infrastructure facilities including electrical transmission, communication, fuel (both gas and liquid) storage and transmission, and wastewater; and preparedness planning.

The Citizen's Advisory Committee serves under the auspices of SIHSAC specifically to study the issue of seismic structural upgrade of unreinforced masonry buildings. They will recommend effective means to upgrade such structures to prevent their collapse in an earthquake. Most unreinforced masonry buildings are located in the Tenderloin, Chinatown, and the Bush Street Corridor; one such building, vacant firehouse 30, is in the Project Area.

IMPACT

This section describes topographic changes and provides estimates of the amount of earth material to be moved in the Project Area by dredging, grading, and excavation for foundations. It also contains a discussion of geotechnical characteristics of the soil which may constrain development and land use, including its susceptibility to seismic hazards. Impacts are discussed for build-out of the Alternatives when full effects would be evident.

TOPOGRAPHY AND GRADING

Permanent changes in topographic relief would be associated mainly with the construction of low berms to provide sufficient depth of soil suitable for planting and the development of wetlands (as included in Alternative B). Under each Alternative, the Project Area would remain predominantly flat as it is now. Final elevations would be at or near existing elevations. Temporary changes in topography would occur during excavations for construction and would result if surcharges were used on the site.

The volume of material estimated to be excavated by dredging and for building foundations for each Alternative is summarized in Table VI.K.1. The volumes presented in Table VI.K.1 are estimates rounded to two significant figures. Dredging volumes have been separated into wet dredging, which would occur within China Basin Channel, and dry dredging, which would be initiated on dry land but would extend to sufficient depths to allow flooding of the excavation. Dry dredging would create new wetlands in Alternative B. Directly calculated volumes of soil have been increased by 35% as a contingency factor to provide a conservative analysis. The following assumptions have been made for purposes of estimating the maximum amount of material to be excavated at the site:/31/

- All structures with fewer than six stories (including basement) that would be completely underlain by soil where anticipated areal settlement is less than six inches would be constructed on floating or compensating foundations. One foot of soil would be excavated for each story of building height (because one foot of soil is approximately equal in weight to one story)./32,33/

- Structures six or more stories in height would be pile-supported and a total of one foot of soil would be excavated for their foundations./32/

TABLE VI.K.1: AMOUNT OF MATERIAL EXCAVATED AND/OR DREDGED, BY ALTERNATIVE (Thousands of Cubic Yards)

	Alternative A 1986-2020	Alternative B 1986-2020	Alternative N 1986-2020
Wet Dredging/a/	135	0	0
Dry Dredging/b/			
For T-Wall Construction	85		
China Basin	0	120	0
4th and 6th Streets	0	160	0
South of Pier 54	0	100	0
Foundation Excavation	2,400	3,420	1,910
TOTAL	2,620	3,800	1,910
Additional Dry Dredging/c/			
China Basin	--	40	--
4th and 6th Streets	--	50	--
South of Pier 54	--	25	--
TOTAL	--	115	--

/a/ Dredging of the channel would be done after construction of a T-wall so that small boats could use the channel at low tide. Construction of the T-wall would require excavation of up to 85,000 cubic yards. Initial dredging of 45,000 cubic yards with an equal amount dredged approximately every ten years is assumed for these estimates.

/b/ For construction of T-wall and creation of wetland areas. If the water table is too shallow, it may be necessary to finish dredging in the wetland areas using wet-dredging techniques.

/c/ This assumes that if soil exposed by initial dredging were unsuitable as substrate for wetland vegetation, two more feet would be dredged.

SOURCE: Environmental Science Associates, Inc. and KCA Engineers.

- All structures located where anticipated areal settlement is greater than six inches would be pile-supported and one foot of soil would be excavated, regardless of building height./32,33/
- The footprint of each office building, S/LI/RD structure, and hotel would occupy 80% of its parcel; and residential buildings would have footprints occupying 75% of their parcels./34/ There would be 100% coverage of some parcels if parking were included, but the building footprints requiring foundations would not be likely to cover the entire parcel.

These assumptions regarding excavation and foundation type are based on general guidelines and requirements for ensuring structural integrity of buildings under earthquake groundshaking hazard estimates at the site, as well as general soil and groundwater constraints (see discussion beginning on p. VI.K.7).

Surcharging

Surcharging, the placement of added fill on site to speed up settlement, is done to preconsolidate highly compressible soils like those found at Mission Bay. When a load is placed on soil, spaces between grains of soil are squeezed and the soil compresses. Surcharging soil on a building site is allowed to remain until a significant amount of consolidation has occurred. Then when the surcharged soil is removed to allow placement of the building, much of the settlement will have already occurred under the weight of the surcharge. No specific plans for the use of surcharges have been proposed although this is a common practice for construction in Baylands. If surcharging were used at Mission Bay, it would involve the placement of from two to five feet of soil on and around the building site for at least six months and preferably one to two years. The placement of drainage wicks in the soil would allow for rapid removal of water being squeezed out of the soil and would speed consolidation. If wicks were not used, surcharging would occur too slowly to be useful in areas where Bay Mud is greater than 10 to 20 feet thick./1/ This includes most of the Project Area (see Figure VI.K.4, p. VI.K.6).

Differential settlement is expected at the boundary of the surcharge area. In order to prevent these edge effects, the surcharge as a general rule would extend beyond the footprint of the building for a distance equal to approximately twice the depth to the bottom of the Bay Mud or as determined necessary by further studies. At the beginning of construction for a surcharged site, the surcharge would be moved to another location, where it would continue to serve as a consolidating agent. To maintain the original elevation of the ground surface, it would be necessary to add clean fill (composed of engineered soil with no trash or construction debris) to the surcharged area. Calculations done by Dames and Moore for an area underlain by 90 feet of Bay Mud and 15 feet of fill indicate that 2.5 feet of surcharge (with wicks) in place for one year could result in four feet of settlement./33/ Such an area could require almost 6,500 cubic yards of soil per acre to raise the surface to the elevation it had when surcharging began.

While surcharging can reduce hazards of settlement where it is used, it can increase the hazard of lateral spreading of unconsolidated fill and mud in adjacent areas. In addition, surcharging near the bayshore can induce slowly moving mud waves offshore. Mud waves within China Basin Channel and off the Bay shore would reduce water depth and could impede commercial and recreational navigation unless removed by dredging. Additionally, a mud wave could effect a change in benthic organisms. Mud waves are discussed on p. VI.K.30.

Disposal of Excavated Material

Disposal of excavated materials and dredge spoils would depend on their degree of contamination with hazardous materials. Based on preliminary assessments by KCA Engineers and CH_2M Hill (see p. VI.L.10), it is likely that wet dredge spoils from the channel would be contaminated with heavy metals and organics and would require special handling and disposal./35,36/ It is possible, and in some locations likely, that dry dredge spoils and foundation excavation materials would also require similar treatment. The likely nature and disposition of hazardous materials are discussed later in this section.

Clean dry-dredge spoils could be used to construct berms for planting, temporarily used as surcharge material, or hauled off-site in trucks to a location where clean fill would be accepted. The locations of disposal sites and routing have not been determined.

Alternative A

Total amounts excavated for foundations could reach 2,400,000 cubic yards from the start of construction to build-out (see Table VI.K.1, p. VI.K.20). It would be tested for hazardous materials pursuant to local and state requirements and disposed of as appropriate (see Regulatory Framework in VI.N. Hazardous Wastes, p. VI.N.17).

Initial Phase of Development. The initial phase would include construction of a T-wall, a vertical concrete retaining wall, along the north side of the channel and subsequent dredging of the channel. Dry dredging and excavation for the T-wall could result in the movement of up to 85,000 cubic yards of soil. About 45,000 cubic yards of material would be wet dredged (see Table VI.K.1, p. VI.K.20) using a combination of equipment operating from the banks of the channel and equipment on a boat or barge./37/ The channel, when dredged, would enable boats to move more easily at low tides.

Alternative B

Total amounts excavated for foundations could reach 3,420,000 cubic yards from the start of construction to build-out. Up to 380,000 cubic yards of material would be dredged for creation of wetlands at China Basin Channel, China Basin near Pier 48 and near Pier 54. This total dredging includes 160,000 cubic yards at the China Basin Channel wetlands site between Fourth and Sixth Streets; possible additional 50,000 cubic yards may be dredged if the soils are found to be unsuitable for wetlands vegetation, either because the soil has the wrong physical characteristics or is contaminated. The dredging total also includes 120,000 cubic yards at the China Basin site near Pier 48 and 100,000 cubic yards at the site near Pier 54; additionally 65,000 cubic yards (40,000 cubic yards at China Basin and 25,000 cubic yards south of Pier 54) may be dredged at those sites if the soil is found to be unsuitable for wetland vegetation. The additional soil removed because of unsuitability would require an equal volume of suitable material (clean fill) imported as its replacement. Creation of planting berms and islands in wetlands could require up to 65,000 cubic yards of fill. If the dredged or excavated material were suitable, some of it could be used to construct the berms and islands. Material not used on-site would be disposed as for Alternative A.

Initial Phase of Development. The initial phase would require excavation of at least 26,000 cubic yards of soil for foundations.

Alternative N

Total amounts excavated for foundations could reach 1,910,000 cubic yards from the start of construction to build-out. It would be tested and disposed of as for Alternative A.

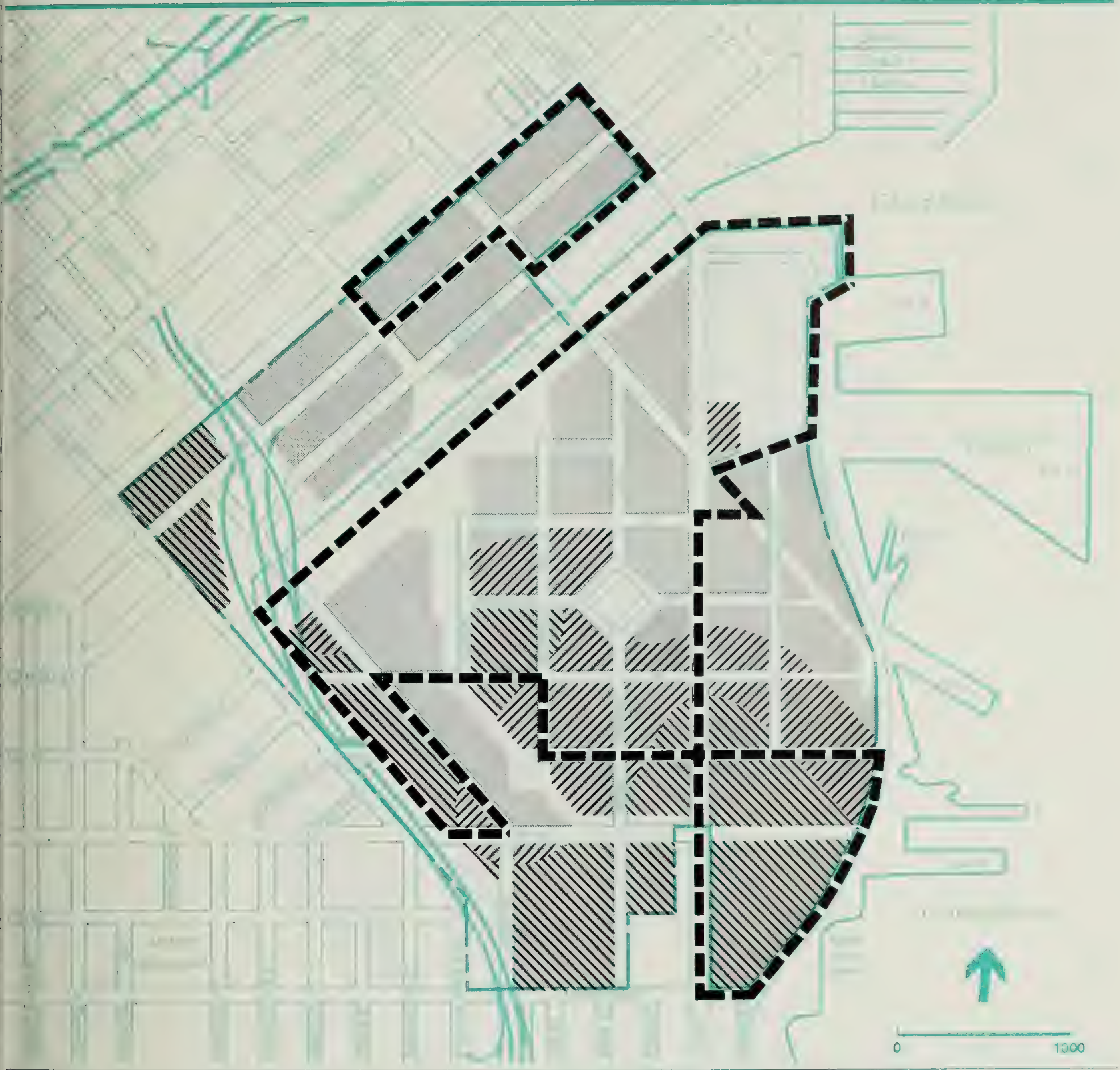
GEOLOGIC SITE DEVELOPMENT CONSTRAINTS

Areal Settlement and Foundation Types

Selection of foundation types for each building would depend primarily on the building height and amount of settlement expected at the building site. Detailed geotechnical engineering studies of each building site would be required before foundations could be designed. The following information provides general guidelines based on information presently available about the soil in the Project Area and building types proposed. Figures VI.K.8, VI.K.9, and VI.K.10 illustrate areas where various foundation types could be used, based on the combination of expected settlement and building heights. Table XIV.I.1 in Appendix I, p. XIV.I.1, shows acreage devoted to building uses in each of the three settlement zones. Table VI.K.2, p. VI.K.28, lists some foundation types, including shallow foundations and piles, and summarizes some of their basic characteristics.

Piles would be used to support structures built in areas where expected settlement is greater than six inches or where buildings would be greater than five stories in height (including basement), regardless of the amount of settlement of underlying soil expected in the area./38/ Pile-supported structures would not settle appreciably, but the surrounding roads, sidewalks, and open space would continue to settle at the predicted rates. This would cause sidewalks and driveways to sink away from buildings. The changing relative elevations of the building and the surrounding land can break utility connections./39/ Because most settlement is expected to occur within 30 years after construction, damage to utility lines would be most likely during that time frame. This effect would be most severe where total settlement is expected to exceed six inches and less severe where settlement would be less. In general, settlement damage can be partially or completely mitigated through use of ductile materials and special joints on utility lines.

Foundations for structures of one to two stories could be conventional spread footings or stiffened slabs, without basements, in areas where limited differential settlement (variations in amount of vertical settlement over short distances) is expected and anticipated areal settlement is less than two inches. Stiffened slabs can be used to span soft areas which are small relative to the building size, if the load-bearing perimeter of the slab is well supported. Buildings on these foundation types settle faster than surrounding soil because the load has been increased by the weight of the structure.



MISSION BAY BOUNDARY — AREA BUILT BY YEAR 2000

▩ Area where piles required

Piles could be required anywhere in the Project Area, but if differential settlement and other soils and groundwater conditions are favorable, as determined by site-specific geotechnical investigations, the following may substitute for pile foundations:

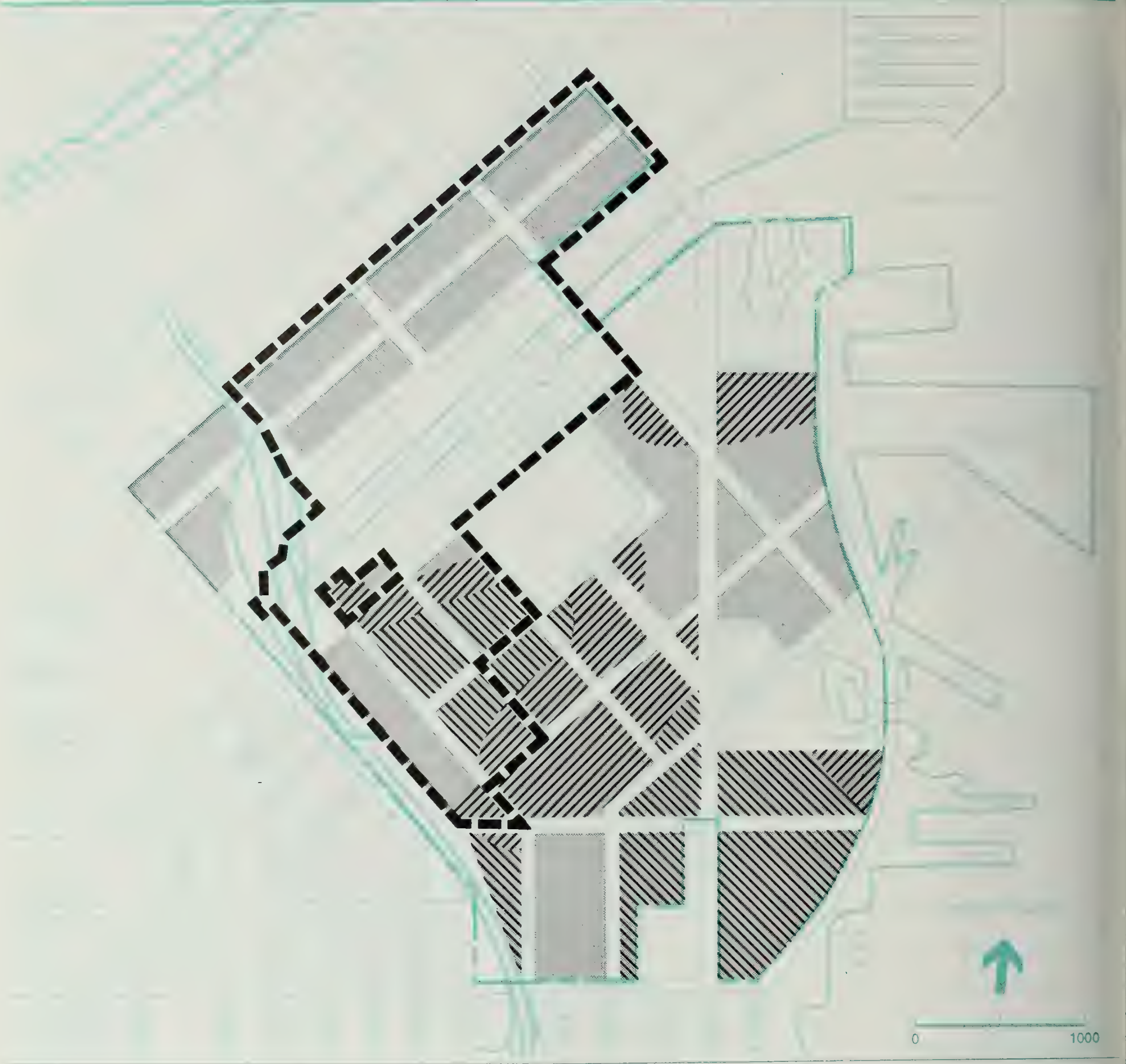
▨ Compensating foundations may be possible (1-5 stories)

▧ Spread or slab (1-2 stories) or compensating foundations (1-5 stories) may be possible

Mission Bay

SOURCE: Environmental Science Associates, Inc.
and Dames & Moore

FIGURE VI.K.8
ALTERNATIVE A
FOUNDATION TYPES



MISSION BAY BOUNDARY ▬ ▬ ▬ ▬ ▬ ▬ AREA BUILT BY YEAR 2000

▨ Area where piles required

Piles could be required anywhere in the Project Area, but if differential settlement and other soils and groundwater conditions are favorable, as determined by site-specific geotechnical investigations, the following may substitute for pile foundations:

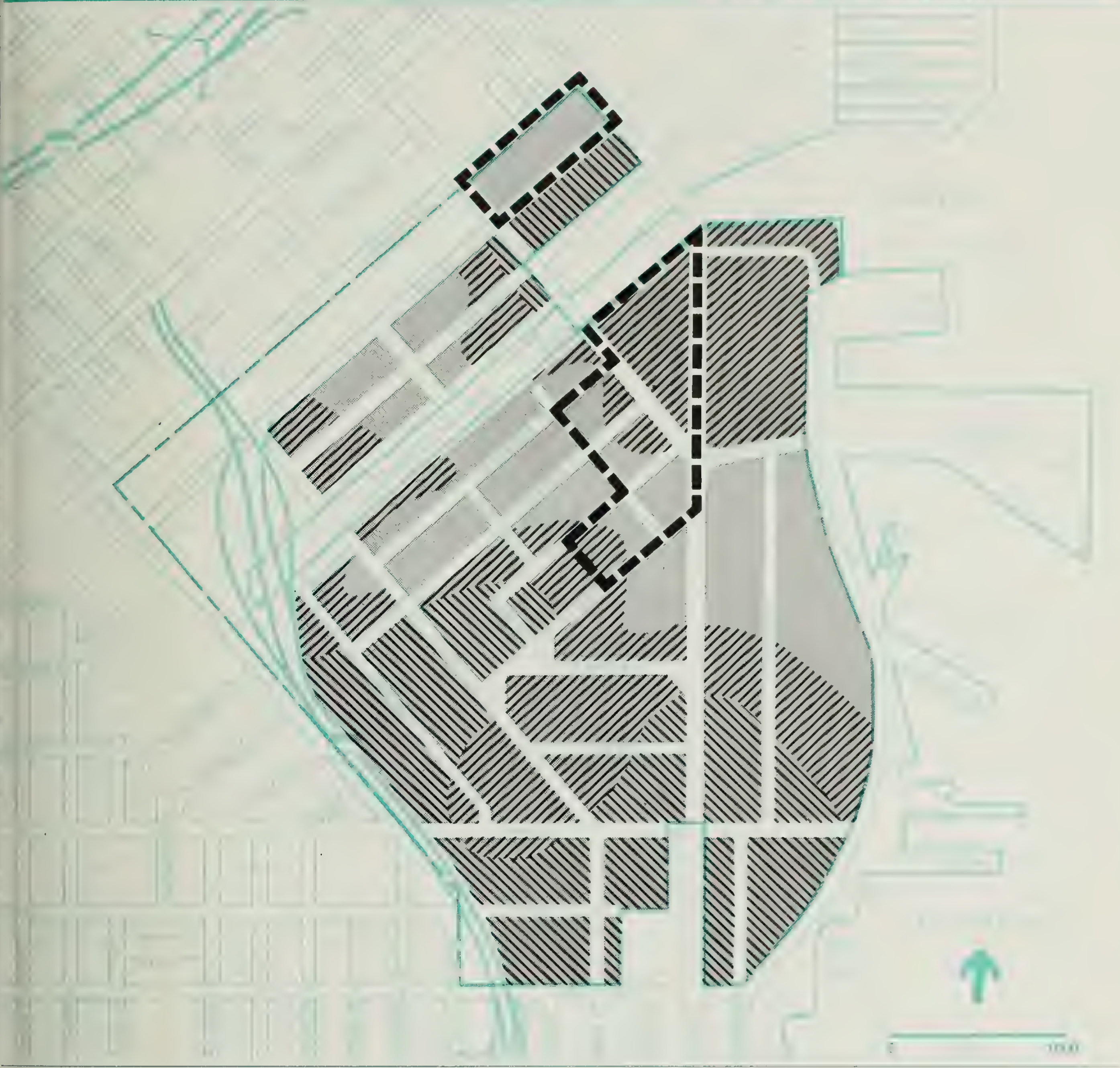
▨ Compensating foundations may be possible (1-5 stories)

▨ Spread or slab (1-2 stories) or compensating foundations (1-5 stories) may be possible

Mission Bay

SOURCE: Environmental Science Associates, Inc.
and Dames & Moore

FIGURE VI.K.9
ALTERNATIVE B
FOUNDATION TYPES



MISSION BAY BOUNDARY

AREA BUILT BY YEAR 2000

▨ Area where piles required

Piles could be required anywhere in the Project Area, but if differential settlement and other soils and groundwater conditions are favorable, as determined by site-specific geotechnical investigations, the following may substitute for pile foundations:

▨ Compensating foundations may be possible (1-5 stories)

▨ Spread or slab (1-2 stories) or compensating foundations (1-5 stories) may be possible

Mission Bay

FIGURE VI.K.10
ALTERNATIVE N
FOUNDATION TYPES

OURCE: Environmental Science Associates, Inc.
and Dames & Moore

TABLE VI.K.2: FOUNDATION TYPES WHICH MAY BE USED AT MISSION BAY/a/

Foundation Type	Floors	Basement	Potential Land Use	Comments on Foundation Type
Spread	1-2	No	S/LI/RD LDR CF	Can be used in areas with little areal settlement and negligible differential settlement. Easily damaged by liquefaction.
Stiffened slab	1-2	No	S/LI/RD LDR CF	Sustains some areal settlement, negligible differential settlement. Sensitive to liquefaction effects. Stiffened slabs resist effects of differential settlement over distances less than the slab size.
Compensating (aka raft or floating)	1-5	Yes	S/LI/RD LDR,MDR CF	Can be used in areas with some areal settlement and negligible differential settlement. Settles at same rate as surrounding soil but is sensitive to differential settlement. Sensitive to liquefaction effects. Taller buildings may be sensitive to amplification of seismic waves by underlying soft sediment.
Friction Pile	Any	Yes	Any	Used to transfer load of structure and downdrag to stiff soil beneath Bay Mud. Requires at least 50 feet to 70 feet of stiff soil. Soil will settle away from structure, causing problems with connection to sidewalks, driveways, utilities. Resistant to liquefaction if piles extend below affected substrate layers. Taller buildings may be sensitive to amplification of seismic waves by underlying soft sediments as piles move with the soil.

(continued)

TABLE VI.K.2: FOUNDATION TYPES WHICH MAY BE USED AT MISSION BAY/a/ (continued)

Foundation Type	Floors	Basement	Potential Land Use	Comments on Foundation Type
End-Bearing Piles	Any	Yes	Any	Transfers load of structure and downdrag to bedrock. Due to variable nature and surface of bedrock, may require considerable penetration into bedrock. Soil settles away from structure causing problems with connection to sidewalks, driveways, utilities. Resistant to liquefaction because piles are supported on firm bedrock.

/a/ Detailed site investigations would be required prior to design. This is a list of some common foundation types and is not exhaustive. Other foundation types are possible.

SOURCE: Environmental Science Associates, Inc., using information provided in Dames and Moore, Preliminary Report, Geotechnical Consultation, April 15, 1982

Connections to utilities, sidewalks, and driveways are therefore vulnerable to breakage. Most settlement would occur within 30 years after construction and the greatest potential for property damage would be during that period.

Compensating foundations for structures of up to five stories could be used in areas with limited differential settlement and where areal settlement is less than six inches. To build this type of foundation, also known as floating or raft foundation, soil equal in weight to the completed building is removed and the building is constructed in the excavated area. The building settles at the same rate as the surrounding soil because the load on the soil is substantially unchanged. For purposes of planning, one foot of soil is roughly equivalent in weight to one floor of building height.

Differential Settlement

Total areal settlement as discussed above can cause problems at points where structures and surrounding areas join; however, differential settlement can be a much more serious impediment to construction. Differential settlement occurs when nearby areas have different characteristics (such as thickness of underlying Bay Mud) which cause significantly different amounts of settlement and rates of settlement. The stress placed on structures by uneven ground movement as a result of differential settlement can damage the structures. The entire central and eastern parts of the site, where expected settlement is greater than two inches (see Figure VI.K.6, p. VI.K.9), may be subject to substantial differential settlement. The most severe effects of differential settlement would be expected immediately south of the channel where pile-supported structures have stood or where dock-height fills (fill emplaced to raise ground level to height of loading docks at warehouses) are found and where the zones of expected settlement are narrow (see Figure VI.K.6, p. VI.K.9). It is possible that a new building could use existing piles for support or employ the dock-height fills as surcharge if the footprint of the new building were entirely supported by the existing piles or the dock-height fills.

Mud Waves

Heavy loads placed on natural or artificial fill materials within 200 feet of the southern edge of the channel or along the bayshore could (but would not necessarily) cause mud to squeeze out along the unsupported face at the water's edge, forming mud waves. The 200-foot distance from the channel or bay shore should be regarded as conservative: fill could be placed closer to the shore and not cause mud waves to form. A structure that is pile-supported would not cause mud waves. Mud waves would reduce water depth and might hinder marine navigation. They may also affect benthic ecology.

Groundwater Levels

Lowering the water level for any reason, such as dewatering during construction or to keep basements dry after construction, would accelerate settlement, including differential settlement. Dewatering could cause settlement effects on existing nearby structures as well as for buildings on the site. This could limit the use of compensating foundations to those areas where the groundwater table is several feet below ground surface, where major dewatering would not be necessary. There are no areas where groundwater is deep enough for a full basement to be used without dewatering. Those conditions apply equally to all Alternatives during the entire development period.

Effects of groundwater chemistry and water quality are discussed in VI.L. Hydrology and Water Quality, p. VI.L.19.

Corrosive Soils

Soils at Mission Bay, which are heterogeneous and include construction debris and trash, may include local areas with high sulfate concentrations. Detailed site-specific soil sampling would be necessary to determine sulfate levels in site soils. Soils rich in sulfate can be corrosive to concrete pipes or foundations. High chloride content, which would be expected at a site with brackish groundwater, can promote corrosion of metal pipes and metal reinforcements in concrete structures. These conditions apply throughout the Project Area to all three Alternatives during the entire development period.

Alternative A

As shown in Figure VI.K.8, p. VI.K.25, approximately 94.5 acres of land would have been developed at build-out under conditions calling for the use of pile-supported structures. This would include offices (26.8 acres), HDR (7.0 acres), MHDR (20.8 acres), and the hotel (3.5 acres) more than five stories tall. Pile-support would be expected for S/LI/RD (1.2 acres), Port-Related/M-2 (6.5 acres), MDR (23.8 acres), LDR (4.2 acres), and community facilities (0.7 acres) in areas where expected settlement is greater than six inches. About 107.5 acres would be developed under conditions that may require pile-support for foundations. This would include S/LI/RD (49 acres), retail (0.4 acre), LDR (2.2 acres), MDR (39 acres), community facilities (1.7 acres), and a CalTrain station (13.7 acres). The existing pump station is already pile-supported (1.5 acres). About 123 acres would be used for open space, streets and infrastructure or left vacant.

Housing along the Channel, S/LI/RD south of 15th Street, and LDR built along the waterfront just north of 15th Street the potential to cause mud waves if shallow foundations were used.

Initial Phase of Development. All buildings developed in the initial phase would require pile supports because they are located in areas where more than six inches of settlement is expected or are taller than five stories. If buildings constructed during the initial phase were pile-supported, they would not cause lateral spreading of soils that could result in effects on adjacent parcels or mud waves. The MDR along the channel (if not pile-supported), S/LI/RD structures south of 15th Street, and LDR north of 15th Street are near unsupported surfaces and could cause mud waves if structures overload the bearing capacity of the soil.

Alternative B

At full build-out in the year 2020, pile-supported structures would be constructed on 70.2 acres of the Project Area. This would include buildings for offices (5.9 acres), retail (0.2 acres), housing (MHDR, 41.1 acres; MDR, 13.9 acres; LDR, 6.5 acres), and community facilities (2.6 acres).

About 96.5 acres would be developed and may require pile-supported foundations. This would include S/LI/RD (6.0 acres), retail (2.0 acres), LDR (12.4 acres), MDR (59.3 acres), community facilities (3.0 acres), and a CalTrain commute station (12.3 acres). The existing pump station is already pile-supported (1.5 acres). About 158.3 acres would be used for open space, streets and infrastructure, or left vacant. Housing units along the waterfront south of Pier 64 could induce mud waves if spread or slab foundations were used.

Initial Phase of Development. The initial phase of development would occur where differential settlement may be severe. The office structure would have to be pile supported. The housing and retail space may require piles.

Alternative N

A total of 57.2 acres (offices, 5.2 acres; M-2 Industrial, 31.2 acres; Port-Related/M-2, 20.0 acres; and community facilities, 0.8 acres) would require piles. About 182.8 acres may require supported foundations, including retail (1.7 acres), M-2 Industrial (98 acres), Port-Related/M-2 (45.5 acres), and the CalTrain station (36.1 acres). The existing pump station is already pile-supported (1.5 acres). About 85.0 acres would be open space, streets and infrastructure or left vacant.

The M-2 Industrial buildings along the channel and Port-Related/M-2 on the waterfront could induce mud waves if constructed on slab or spread foundations.

CONSTRUCTION HAZARDS

The water table at the site ranges from three feet to nine feet deep. If it is necessary to excavate below the water table during construction, dewatering would be required. Dewatering would accelerate the rate of settling in areas near excavations causing increased differential settlement of adjacent structures. The side walls of the excavation would require reinforcement in order to avoid collapse or deformation of the excavated area. If such collapse were to occur, it would pose a hazard to workers at the construction site and to nearby passersby on sidewalks and streets. In addition, it could damage buildings and infrastructure in adjacent areas. These conditions are typical of construction in many areas of San Francisco and would apply to all Alternatives during all phases of development.

Excavation and pile-driving in the Project Area could experience delays because of the variable nature of fills that are likely to be found. For example, the portion of the Project Area around the end of China Basin Channel was used as a City dump; other parts north of the channel were used for the disposal of debris after the 1906 earthquake and fire. Therefore, it is likely that a wide variety of artificial materials would be encountered which could make subsurface construction activities more difficult than usual in natural bay muds.

SEISMIC HAZARDS

Groundshaking

The entire site would be subject to violent or very strong groundshaking during maximum earthquakes expected on the major faults in the Bay Area./19/ The faults analyzed include the San Andreas (8.4 magnitude), Hayward (6.9 magnitude), San Gregorio (7.1 magnitude), and Calaveras (7.3 magnitude). Groundshaking would be similar to that in South of Market and portions of downtown. The extent of building damage would depend on the type of groundshaking generated by the earthquake as well as the kind of building construction. Soft sediments such as Bay Mud are likely to amplify seismic waves when groundshaking occurs at lower frequencies (long waves) that resonate within the soil column. In those cases, buildings at Mission Bay that vibrate at the same low frequency as the sediments and that are underlain by unengineered fill and Bay Mud would shake more than those supported on bedrock. Studies of the recent earthquake in Mexico City (built on lake muds), for example, indicated that buildings in the height range of 5 to 15 stories had resonant frequencies that matched the longer earthquake waves amplified by those soft soils; therefore, buildings in those height ranges were most vulnerable to damage./40/ In the Project Area, the buildings most at risk to damage from this type of groundshaking also would be five-story or taller buildings. Building form and mass also affect response to shaking. In general, tall narrow buildings would be more vulnerable to earthquake shaking damage than would lower, broadly massed buildings.

In contrast, earthquakes that generate high frequency (short wave) motions may not resonate in the deep muds, sands and fill; therefore, under such earthquake motion, buildings at Mission Bay may be at equal but not greater vulnerability than those on bedrock or on muds, sands, and fill which lie in shallow layers over bedrock.

Ground Failure

Ground failure resulting from seismic shaking, as well as damage caused directly by the shaking itself, would also affect infrastructural elements in the Project Area and in the vicinity including highways, bridges, utilities, and piers./41,42/ Some roads in the susceptible areas may become impassable because of cracking from subsidence and liquefaction. In the event of an 8.3 Richter magnitude earthquake on the San Andreas Fault or a magnitude 7 earthquake on the Hayward Fault, the San Francisco Bay Bridge is projected to be closed for at least three days because of subsidence and liquefaction on the east approach, and possible failure of the elevated structures in San Francisco./41,42/ The Golden Gate Bridge would be closed because of impassable approaches. The downtown freeway system (James Lick Freeway and Highway 101) would be closed for at least three days because of ground failure./41/ The elevated portion of I-280 is likely to be significantly damaged during a strong earthquake, but it should not experience general collapse./43/ Traffic on I-280 would be limited to one lane for at least 24 hours due to landslides at Potrero Hill./42/ The CalTrain commute station and commute line would be closed, as would MUNI. BART would be out of service for a minimum of 72 hours./42/ These closures would result from a combination of ground failure, power outages and debris-blocked tracks and streets./22,41/ Port facilities adjacent to the site are likely to remain usable for emergency operations, but transport of people and supplies from the port to various locations in the city would be impaired by closed streets./44/ Other emergency services communication, such as radio contact, is expected to operate at higher capacities.

Telephone communication systems within San Francisco would be at or under 25% of full system effectiveness for at least three days after a major earthquake, and a total restoration of service would take considerably longer. Potrero and Hunters Point power plants would be shut down for an indefinite period./44/ Other emergency service communications, such as radio contact, are expected to operate at higher capacities.

Because of the potential collapse of elevated roads, blockage of streets by building debris, and damage to bridges in the event of a major earthquake, accessibility to Mission Bay would be impaired from the north and west. This impaired access could delay emergency rescue and fire control operations and could limit the Project Area's usefulness as a potential evacuation site for residents of potentially heavily damaged sections of northeast San Francisco.

Liquefaction, including possible lurching and lateral spreading resulting from liquefaction, and rapid settlement are the types of seismically induced soil failure likely to occur in the Project Area./40/ Except for the northeastern corner of the site where bedrock is near the surface, liquefaction and settlement potentially would occur throughout the Project Area. Lurching and lateral spreading would be most likely to occur within several hundred feet of China Basin Channel. The area north of the channel would be at greatest risk from liquefaction.

Building Types

Because of the variety of land uses proposed, several building types would be used at Mission Bay. Table VI.K.3 summarizes some general information about the response of building types to groundshaking. Well designed and carefully constructed new buildings can be expected to remain standing after a major earthquake, but there is wide variety in the amount of expected damage due to groundshaking, the major cause of structural damage./45/ Light metal and wood frame buildings would respond best to groundshaking, and damage for those types of buildings would be less than 10%. Steel-frame buildings would be expected to perform well but would suffer somewhat more damage, mostly non-structural. Reinforced concrete buildings are more susceptible to damage than light metal, wood frame, and steel-frame structures. Tilt-up concrete buildings would be expected to undergo the worst damage, especially if they are poorly tied together. Unreinforced masonry buildings perform poorly during seismic activity and are not recommended or expected to be built at Mission Bay./46/

Damage to Infrastructure

During a major earthquake, there would be substantial damage to roads, bridges, sewers, water mains, utility conduits, and other infrastructure elements, similar to other areas in northeast San Francisco./40/ Roads and underground utilities north of the channel and west of Fourth Street are likely to experience general severe damage resulting from extensive liquefaction, such as cracking and buckling of the pavement and bending and

TABLE VI.K.3: BUILDING TYPES WHICH MAY BE USED AT MISSION BAY

Building or Foundation Type	Potential Use	Floors	Expected Damage Based on Seismic Design of Building/a/ Ordinary Design	Superior Design	Comments/b/
Wood Frame	LDR, S/LI/RD, M-2, Port-Related Community Facilities	1-3	5-10%	5-10%	Generally withstands earthquakes well (except for those built over parking structures/c/). Damage common around large openings. Should be bolted to foundation. Can include leveling jacks to compensate for differential settlement. Masonry chimneys increase likelihood of damage.
Light Metal Frame	S/LI/RD, M-2, Port Related	1-3	0-5%	0-5%	Generally performs very well. Bracing often bent or pulled out.
Concrete Tilt-Up	Offices, S/LI/RD	1-3	27-30%	0-18%	Roof-to-wall and wall-to-frame connections must be secure for adequate performance in earthquakes. Large openings and windows decrease building integrity. Can perform well if they include walls which are well-connected to the foundation and strong connections on precast panels, but past experience has shown that they often perform exceptionally poorly.
Reinforced Concrete	Offices, S/LI/RD, HDR, MHDR, MDR, Community Facilities	Any	17-22%	0-12%	Can perform well. Non-structural damage common. Must include reinforcement and construction and installation details to increase ductility. Curtain walls are more susceptible to damage than cast-in-place walls. Requires careful design of shear walls.
Steel Frame	Offices, S/LI/RD, HDR, MHDR, MDR, Community Facilities	Any	12-17%	0-10%	Most earthquake-resistant type because structures are relatively light and can be damaged extensively without collapse. Often suffer major nonstructural damage. Masonry infill walls and precast curtain walls may not perform well. Concrete or masonry shear walls (to form dual bracing system) generally perform well.

/a/ Percentage expected damage to building types from violent shaking (B on the San Francisco scale of groundshaking intensity) for buildings incorporating either ordinary or superior earthquake design as described in "Building Stock and Earthquake Losses - The San Francisco Bay Area Example," ABAG, pp. 17-20, May 1986.

/b/ These comments refer to well-designed, well-maintained buildings which do not have complex geometries or peculiar shapes. Large openings can reduce structural integrity. The categories include the most common building types normally used in the Bay Area. Other less common construction types may be used at Mission Bay.

/c/ Parking structures constructed of concrete, steel, or masonry tend to perform poorly. Partial or full collapse of the parking structure can result in greater damage to the wood-frame portion of the building than normally would be expected.

SOURCE: Environmental Science Associates, Inc.; EQE, Preliminary Earthquake Risk Assessment of Mission Bay Project, 1986; ABAG, 1986, "Building Stock and Earthquake Losses - The San Francisco Bay Area Example."

breaking of pipes, resulting in loss of utility service. Liquefaction damage also could be locally severe south of the channel and lurching could damage roads and utilities near the waterfront and the channel. Broken fuel lines would increase the likelihood and severity of fire. Additional water supplies for firefighting, such as cisterns or pumps to take water from the Bay, would be needed to fight fires after a major earthquake.

Following a major earthquake, street access to the portion of the site south of the channel could be limited to 16th Street, which passes under I-280, and Third Street at the southern part of the site. Third Street would likely be impassable at the channel because of settlement of up to two feet at the bridge approaches./40/ The bridge approaches could be made serviceable in a relatively short time if heavy equipment were available. The Third Street Bridge would probably be stuck in its position at the time of the earthquake, most likely in the down position, due to damage to the bridge-raising mechanism. It is expected that the counterweight on the Fourth Street Bridge would be damaged, making the bridge unusable for some time./40/ The new Owens Street bridge in Alternatives A and B is likely to withstand the earthquake in usable condition; however, unless the approaches are engineered to avoid ground failure effects, it would also be impassable until heavy equipment is available to clear and grade the approaches. If sufficient debris to close 16th Street were to fall from I-280, then Third Street from the south could provide the only access to the portion of Mission Bay south of the channel. Third Street would be passable by trucks although some pavement damage would result from soil failure and debris could temporarily block the street.

Access north of the channel could be impaired because of debris from damaged older existing buildings nearby. Warping and fracturing of pavement would result from liquefaction, uneven settlement and lurching. Some of the roads probably would be passable in trucks and four-wheel drive vehicles./40/ Severely damaged or debris-blocked roads could be made usable in a relatively short time through use of heavy equipment.

Affected Population

Employee and resident populations for Mission Bay are summarized in Table VI.K.4. The area has been subdivided into two parts:

> the north of China Basin Channel area, which in the event of a major earthquake likely would not be cut off from emergency services based north and west of Mission Bay, and the combined east and west of Third Street areas south

TABLE VI.K.4: POPULATION AT MISSION BAY SUBJECT TO SEISMIC HAZARD/a/

		2000			Build-Out/2020		
	1985	Alt. A	Alt. B	Alt. N	Alt. A	Alt. B	Alt. N
North of China Basin Channel							
Residents		0	3,200	0	1,700	6,900	0
Employed Residents		0	2,100	0	1,300	4,100	0
Unemployed Residents		0	1,100	0	350	2,700	0
Employees (Project Buildings)	0	5,200	270	3,600	17,000	370	5,500
Employees (Pre-1985 Buildings)	2,000	130	180	160	---	---	---
2:00 a.m. Population/b/		500	3,200	0	2,200	6,900	0
2:00 p.m. Population/c/		5,600	1,600	3,700	17,000	3,100	5,500
South of China Basin Channel/d/							
Residents	34	5,500	1,900	36	13,000	12,000	36
Employed Residents		3,300	1,000	26	7,400	7,100	26
Unemployed Residents		2,200	880	10	5,200	5,300	10
Employees (Project Buildings)	0	3,900	4,200	1,900	8,500	5,900	11,700
Employees (Pre-1985 Buildings)		730	900	1,500	---	---	---
2:00 a.m. Population/b/		5,900	1,900	36	13,000	12,000	36
2:00 p.m. Population/c/		7,000	6,000	3,400	14,000	11,000	12,000
TOTAL PROJECT AREA							
Residents	34	5,500	5,100	36	15,000	19,000	36
Employed Residents		3,300	3,100	26	8,700	11,000	26
Unemployed Residents		2,200	2,000	10	5,600	8,000	10
Employees (Project Buildings)	0	9,100	4,500	5,500	26,000	6,300	17,000
Employees (Pre-1985 Buildings)	2,000	860	1,000	1,700	---	---	---
2:00 a.m. Population/b/	34	6,400	5,100	36	15,000	19,000	36
2:00 p.m. Population/c/	2,000	13,000	7,600	7,100	31,000	14,000	17,000

/a/ Numbers may not add due to rounding. Visitors are not included in the population totals, but an unknown number of visitors would also be at risk.

/b/ 2:00 a.m. population consists of residents plus 500 hotel guests (for Alternative A).

/c/ 2:00 p.m. population is assumed to consist of employees, unemployed residents, and 200 hotel guests (for Alternative A).

/d/ Includes houseboats on channel (moored on the south side).

SOURCE: Recht Hausrath & Associates and Environmental Science Associates, Inc.

- of China Basin Channel, which might be accessible only from the south until heavy equipment is available for clearing of bridge approaches and access streets.

Predictions of injuries and death can be made based on the exposed population, the kinds of building construction, and the intensity of groundshaking and ground failure. The population figures in Table VI.K.4, p. VI.K.38, can be used in conjunction with predicted death and injury rates based on structural damage for buildings shown in Table XIV.I.2, on p. XIV.I.2 in Appendix I, to estimate casualties. Visitors to the Project Area would be exposed to seismic hazards, but it is not possible to estimate their number reliably. Casualties (deaths and injuries) have been projected for each phase of Alternatives A, B and N. Those projections assume a worse-case earthquake scenario and are intended as estimates of the likely magnitude of casualties. They are not exact predictions of injuries or deaths and are based on assumptions that may or may not be realized in a major earthquake striking the area.

Collapsing buildings, shattering windows, falling exterior cladding and other decoration, falling masonry walls and chimneys are common causes of casualties in an earthquake. Pedestrians as well as building occupants would be exposed to these hazards. Additional casualties to building occupants could be caused by nonstructural damage, such as sliding furniture, falling bookcases, collapse of suspended ceilings, tipping filing cabinets, or any heavy object stored or displayed where it could fall.

Houseboats would be primarily affected by water movement in China Basin Channel, possibly as a result of a tsunami. The main hazard would be collisions with docks and other boats, or ground failure due to soil lurching along the waterfront. The boats may suffer a cutoff of utility services because of broken water lines, power lines, etc.

If an earthquake were to occur during construction of a building, damage to the partially completed structure could be severe and excavations would be subject to possible failure. Furthermore, the construction equipment, such as cranes, or building materials could fall or move. If the earthquake were to occur during working hours, construction workers would be at risk, as would passersby at any time.

During a major earthquake, property damage and human injury described above would occur at other parts of the City to a lesser or greater degree. The downtown and South of Market areas could be severely affected because of the high density of development, large number of older buildings and generally poor soil conditions, including large areas of fill.

The citywide need for emergency response would result in heavy demand for service providers, including the Police Department, Fire Department, ambulance service, hospitals, and utility repair crews. Services for the city as a whole would be pushed to their limits; no one area of the City would receive a full, normal level of attention.

Access to Mission Bay for emergency response probably would be available for the area north of China Basin Channel. Although streets would suffer disruption and some debris blockage, trucks and four-wheel-drive vehicles should be able to access the area. Repairs to streets would include levelling of the surface and removing accumulated debris and could take hours to days, depending on the availability of personnel and heavy equipment.

The area south of China Basin Channel likely would have poorer access in the aftermath of an earthquake. The Fourth Street Bridge likely would be severely damaged and would be unusable for a long period. The Third and new Owens Street bridges would be temporarily unusable due to settlement of approaches; with heavy equipment, the approaches could be repaired within a few hours. Sixteenth Street may be blocked by debris from the I-280 elevated freeway, but collapse of the freeway is not considered likely./40/ Third Street would be damaged by soil failure but would be usable by trucks.

The port-related facilities on China Basin Channel and the Bay would be damaged by lateral spreading and lurching of soils towards the water./40/ Additionally, the Third Street Bridge will probably be stuck in the down position, preventing access to China Basin Channel except for very small boats. Some piers along the Bay should be serviceable.

Railroad lines at the site could include the existing Southern Pacific line (also used by CalTrain Commuter Services) and a proposed MUNI extension. Rail service to Mission Bay would probably be unavailable for a long period after a major earthquake. The Southern Pacific tracks would be subject to damage from debris from the I-280 freeway overpass and would probably be closed. Liquefaction, ground lurching and differential settlement likely would result in significant damage to the rails, requiring weeks or months to repair (when the larger picture of San Francisco and San Mateo County rail lines are considered). The proposed MUNI Metro line would suffer damage.

The above consideration of emergency vehicle access to Mission Bay south of the channel is indicative of a potential severely limited emergency response in the aftermath of a major, damaging earthquake. While that area would not be cut off from the rest of the City, it could be severely disadvantaged with regard to immediate emergency response from the north. That is, emergency services are likely to be available first to areas that are more easily accessible. Thus, it is possible that other areas of the City may receive emergency response services for many hours following an earthquake before access is opened to Mission Bay. It is possible that emergency services could reach the Project Area from the Port.

While portions of Mission Bay may be disadvantaged from the viewpoint of emergency access, the newer buildings, if they incorporate superior design measures that meet more stringent seismic safety standards, may themselves respond more safely and help to hold down casualties in comparison to other areas of the City. However, this consideration is significant only in a relative sense when comparing Mission Bay to other neighborhoods in San Francisco. Casualties at Mission Bay are a certainty; emergency access is uncertain.

The resources of the Office of Emergency Services would be stretched to capacity by a major earthquake. No special attention could be expected by occupants of the Project Area or any other part of San Francisco. In general, neighborhoods should expect to be self-sufficient for up to three days.

Whether or not development occurs at Mission Bay, the difficulty of reaching the area after a major earthquake would limit its usefulness as a place to which residents of more densely populated areas, such as the Tenderloin, could be evacuated. For those people in the Project Area when a major earthquake occurs, nearby open spaces could be used as evacuation sites if it were necessary to leave unsafe buildings. Ground failure in the vicinity would almost certainly leave the open space areas severely disrupted, limiting their usefulness.

An earthquake during the afternoon commute period would expose more pedestrians to danger from falling debris from buildings and direct effects of ground failure than one occurring at other times of the day. Concentrations of pedestrians would be greatest near the CalTrain depot. The likely pedestrian casualties cannot be predicted because no factors are available./47/

An earthquake during working hours or commute periods would separate many people from their homes because of damage to railroads, BART, bridges, elevated freeways, and major roads. A large number of workers would likely be dependent on local resources for up to three days. Traffic on passable roads during that period would be heavily congested, further delaying emergency response.

The casualty estimates given in the following paragraphs do not include casualties occurring after the earthquake which could be attributed to fire, the stress of evacuation, or the generally difficult condition of coping with a major disaster. The elderly and chronically ill would be particularly vulnerable to such hardships.

Alternative A

At build-out a total of about 15,000 people would be affected by a 2 a.m. earthquake./48/ About 13,000 would be south of the channel. If a 12 to 22% damage rate for steel frame or reinforced concrete construction is assumed, then 45 to 50 minor injuries and five to ten serious injuries and deaths would be expected in the Project Area.

An early afternoon earthquake would affect about 31,000 people, of which about 14,000 would be south of the channel. Assuming the same building conditions as for the 2 a.m. earthquake, there would be about 95 to 100 minor injuries and 15 to 20 serious injuries and deaths in the Project Area.

During the evening commute period, substantial numbers of pedestrians would be concentrated near the CalTrain station at Seventh and Channel Streets and near the offices north of the channel. The Seventh and Channel area would be subject to debris falling from I-280.

Initial Phase of Development. After the initial phase, about 1,000 residents of the Project Area, visitors, and 1,500 employees would be subject to the hazards of a major daytime earthquake. If the MDR units were constructed of wood or light metal frames, no casualties would be expected. If they were constructed of reinforced concrete or with steel frame, fewer than five minor injuries would be expected. If 12% to 22% damage rates occurred to office and S/LI/RD buildings, then there would be about five minor injuries. There would be a total of fewer than ten casualties in the Project Area.

Alternative B

The 2 a.m. population affected by a nighttime earthquake would be about 19,000. About 12,000 would be south of the channel. If the housing south of the channel were wood frame and suffered damage of 5 to 10%, fewer than five injuries fewer than two serious injuries or deaths would be expected. If buildings were steel frame or reinforced concrete with 12 to 22% damage, there would be 35 to 40 minor injuries and five to ten serious injuries and deaths. North of the channel there would be 20 to 25 minor injuries and fewer than five serious injuries and deaths.

At 2 p.m. there would be about 14,000 people in the Project Area. About 11,000 would be located south of the channel, when total casualties in wood frame buildings would be fewer than five. If the buildings were steel frame or reinforced concrete, casualties would include 30 to 35 minor injuries and five to ten major injuries and deaths. North of the channel there would be five to ten minor injuries and fewer than three major injuries and deaths.

During the afternoon commute period, pedestrians would be concentrated near the office buildings on Owens Street and at the CalTrain depot at Seventh and Channel Streets. Both areas would be subject to debris falling from I-280.

Initial Phase of Development. After the initial phase is occupied, about 800 residents would be subject to a nighttime earthquake. If light-metal or wood frame construction were used, no casualties would be expected. If steel-frame or reinforced-concrete construction were used, fewer than five minor injuries would be expected. Office and retail space with about 1,400 employees in steel-frame or reinforced-concrete would result in fewer than five casualties. For the Project Area, fewer than ten minor casualties would be expected.

Alternative N

A nighttime earthquake would affect fewer than 50 people. About 17,000 would be affected by a daytime earthquake. The afternoon event would be expected to cause 50 to 55 minor injuries and about 10 serious injuries and deaths if buildings were steel frame or concrete with 12 to 22% damage. There would be about five minor injuries and fewer than two serious injuries or deaths expected if wood frame or light metal frame construction were used.

During the afternoon commute period, pedestrians would be concentrated at the CalTrain station located at Fourth and Townsend Streets.

Tsunami and Seiches

The 100-year tsunami (1% chance of occurring in any one year) would have a project runup elevation along the Mission Bay shoreline of -3.8 feet, San Francisco datum. That event would raise water levels in China Basin Channel but would not cause flooding at Mission Bay. Houseboats docked in the channel could be damaged from collisions with docks. The 500-year tsunami (0.2% chance of occurring in any one year) would have a runup elevation of -0.6 feet, San Francisco datum. Flooding of the central portion of the Project Area with several feet of water would result in substantial property damage and inconvenience to occupants.

A seiche in San Francisco Bay would have less effect than the tsunami caused by the same earthquake./22/

MITIGATION

GEOLOGIC SITE DEVELOPMENT CONSTRAINTS

Areal and Differential Settlement

Measure	Alternative	Description
K.1	A,B,N	Conduct a comprehensive boring, sampling, and testing program to determine the engineering properties of the soil as is required by the building permit process. Using the results, establish a detailed description of the rate and amount of settlement which would occur on the site. This would include an evaluation of differential settlement. It would be used as part of the information needed to: – determine appropriate layout and slope of surface drainage systems, storm drains, and sewers; – select and design appropriate foundations; – determine amount of settlement which would occur between each building and its utility connections and sidewalks; and – site emergency facilities and infrastructure (see Mitigations K.17 and K.18).
K.2	A,B,N	Use pile-supported buildings wherever feasible and appropriate. That would reduce the need for excavation and mitigate some impacts of settlement and seismic events. Using pile-supported buildings would mitigate the need to dewater and test and dispose of soil, and would improve seismic performance. It would minimize the amount of soil excavated for foundations. As little as one foot of soil over the footprint of each building could be

Measure	Alternative	Description

excavated for pile foundations whereas approximately five feet could be removed for the compensating foundation of a five-story building. For Alternatives A, B, and N, it is generally estimated that the amounts excavated could be reduced by 60%, 75%, and 40%, respectively, of the amounts shown for build-out in Table VI.K.1, p. VI.K.20, if all buildings were pile-supported and no shallow foundations were used.

However, although buildings on piles would not settle because the weight would be supported by stiff sediments or bedrock, the surrounding soil would continue to settle, resulting in disturbance or damage to infrastructure connections to the buildings.

An earthquake would affect pile-supported buildings less severely than buildings with shallow foundations for the following reasons:

- Liquefaction in saturated, sandy sediments would not cause pile-supported buildings to tilt.
- Accelerated settlement of sediments due to groundshaking would not directly affect pile-supported buildings.

The following measures would mitigate the impacts of using piles:

K.2a Retain qualified soils engineers to design and evaluate the use of piles, as required by the building permit process. The following actions would occur:/49/

- design, execution, and evaluation of a thorough test boring program;
- determination that satisfactory materials are found along the bearing length of the piles as well as below the tips of the piles;

Measure	Alternative	Description
		– consideration of downdrag on the pile due to fill overlying compressible soils; and – engineering supervision by soils engineers for every pile installed.
K.2b		Design hinged connections between the fixed, pile-supported structures and sidewalks and driveways underlain by soils that are subject to settlement. The sidewalks and driveways would require special strengthening to withstand the stress created between stationary buildings and settling soil.
K.2c		Design flexible connections for utilities serving pile-supported buildings which would be adequate to accommodate the settlement expected in the surrounding soil. These could be similar to current installation practices by the Department of Public Works, which uses water, gas, and sewer line materials that are more elastic than those used earlier, with more flexible mains and joints. In addition, lines are laid in six-foot segments which also affords increased flexibility.
K.3	A,B,N	Use existing piles to support new structures, eliminating the expense of driving new piles, if feasible and appropriate. However, it would be necessary to evaluate the integrity and load-bearing capacity of the existing piles with respect to requirements of structures intended for the site. In addition, it would be necessary to design buildings so that their footprints would be adequately supported by the pattern of the existing piles.
K.4	A,B,N	If shallow foundations are used for any buildings, install leveling jacks as part of the foundation to compensate for

Measure	Alternative	Description
		differential settlement if appropriate. Also, design buildings with flexible utility connections if the buildings would settle more than the surrounding soil.
K.5	A,B,N	Use surcharging and vertical drains to accelerate settlement if it would be useful, effective, and appropriate. Produce detailed schedule of settlement rates and amounts before implementation of a surcharging program. Develop this schedule only after detailed soil samples were taken to evaluate the engineering characteristics of the underlying soils as described in Mitigation K.1. That would partially mitigate the impacts of areal and differential settlement. The amount of areal and differential settlement which would occur after construction would be reduced, thus reducing impacts to infrastructure connections to the building and the functioning of surface drainage systems, storm drains, and sewers. This technique could be used to prepare building sites and adjacent areas so that shallow foundations could be used in areas where presently less than six inches of settlement is expected in the next 30 years. Two to five feet of soil would be placed on the areas being surcharged, probably for one to two years before the beginning of construction on the surcharged area. This would be a continuing source of air and water pollution due to blowing dust and erosion by rainfall which would extend beyond the normal construction period. Impacts of the measure may be mitigated by the following actions:

Measure	Alternative	Description
K.5a		Cover, coat, or seed the bare dirt to protect it from wind and rainfall.
K.5b		If appropriate, use soil excavated from foundation sites as surcharge or fill within other parts of the Project Area to minimize transport of soil.
Groundwater Levels		
K.6	A,B,N	Keep basements above the water table so that dewatering would not be necessary. The rate and amount of settlement would not be increased due to removal of groundwater, and maintenance of pumps and drainage systems would not be required. Construct project streets at existing grades or above, reducing the amount of soil excavation and the potential for encountering groundwater during cutting for utility trenches.
K.7	A,B,N	As required by City guidelines, design surface drainage systems, storm drains, and sewers so that after settlement, the slopes would be adequate for them to function properly.
Corrosive Soils		
K.8	A,B,N	Test soils for sulfate and chloride content. If necessary, use admixtures in concrete so it would not be susceptible to attack by sulfates, and/or use coated metal pipes or plastic pipes so that pipes would be more resistant to corrosion by chlorides.

Measure	Alternative	Description
SEISMIC HAZARDS		
Groundshaking		
K.9	A,B,N	The City of San Francisco could adopt and enforce, as a minimum, the standards of the 1988 Uniform Building Code (UBC) as soon as legally permissible./50/ More stringent standards could be adopted and enforced by the City to account for the following: - complex building shapes, which can require more sophisticated analysis than rectangular buildings; - soils, like thick Bay Mud, which amplify and prolong seismic groundshaking beyond that considered in the current UBC "soil factor" requirements; and - the need to bolt structures to foundations to reduce lateral movement. The San Francisco Building Code then would reflect recent advances in UBC standards, and current codes would be incorporated in building design and construction.
K.10	A,B,N	Require studies that would test the performance of exterior cladding and glazing materials during seismic events and determine those least dangerous particularly to pedestrians. This information could be incorporated into the San Francisco Building Code and implemented in new developments. This would result in the use of less dangerous materials on building exteriors throughout San Francisco.
K.11	A,B,N	Consider peer review for the design of structures at Mission Bay to ensure that state-of-the-art practices have been used. Studies indicate that state-of-the-art

Measure	Alternative	Description
		practices are generally not used./51/ Use of large windows and openings, irregular configurations, and precast concrete panels has been increasing. Each of these features increases the potential for poor performance during an earthquake. Designers are also not using appropriate standards for redundancy, ductility, toughness, compatibility, configuration, size, deformation, shear wall definition, and the need to connect building components./52/ Such a measure would require the City to normally establish or designate a group of qualified geotechnical and structural engineers. Without waiting for the UBC or San Francisco Building Code to make use of recent advances in engineering practice, incorporate into building designs recently acquired knowledge about structural performance in earthquakes to the extent appropriate.
K.12	A,B,N	Require that all materials and equipment, including cranes, be firmly secured as feasible in buildings that are under construction and that appropriate safety harnesses be used by exposed construction workers.
K.13	A,B,N	Require and certify a quality assurance / quality control (QA / QC) program to ensure that materials and construction meet design standards.
K.14	A,B,N	Require bracing or reinforcement of nonstructural features in non-residential structures to prevent casualties and property damage. The items which would be evaluated include computers; heavy ceiling fixtures like lights, ducts, diffusers, and pipes; exterior signs; exterior pre-cast panels or cladding; emergency power generators; elevators; valuable or fragile artwork; water heaters; natural gas

Measure	Alternative	Description
		pipes; tall file cabinets; tall storage racks, bookcases, and shelving; fire extinguishers and fire sprinklers; large electrical equipment, especially transformers; communications systems; and water tanks./54/
		Require that residential units have braced water heaters, and that chimneys in wood frame buildings not be constructed of masonry./53/
Ground Failure		
K.15	A,B,N	Make sandy soil more dense if determined necessary so that liquefaction and lurching would not cause significant impacts. This should be done in areas where shallow saturated sandy material is found during the subsurface geotechnical studies to be performed to evaluate site conditions.
K.16	A,B,N	Require automatic shut-off devices on natural gas lines leading to structures.
Emergency Response		
K.17	A,B,N	Require formulation an emergency response plan for the Mission Bay Area and integrate it into emergency response planning for San Francisco. An emergency response plan should include the following components: – employee organization; – employee training; – communications; – equipment list; – procedures; – command post; – building survey; – evacuation; – medical; – security; and – clean-up.

Measure	Alternative	Description
		It should apply to each building or complex in the Project Area and should be the responsibility of the owners of each building or complex, and should be reviewed by the City periodically to ensure it is kept up to date.
K.18	A,B,N	Site and design emergency facilities so that they would remain functional after a major earthquake. The following standards should be used if feasible: - Construct emergency facilities using pile-supported foundations. - Do not site emergency facilities where more than two inches of settlement is expected during the next 30 years. - Locate public facilities away from elevated freeway structures which could shed debris or collapse in a major earthquake, damaging the facility or making it inaccessible. - Design redundant infrastructure connections. - Design a conservative structure which would be likely to suffer limited damage in a major earthquake. - Provide emergency generators at all important facilities such as fire stations, police stations, hospitals, emergency shelters, and pump stations for water and sewage, to provide backup power. Generators should be located at ground level and should not be mounted on spring isolation systems unless they are specifically designed for seismic loads. Cooling and fuel supply systems for the generators should be adequately anchored to prevent damage during an earthquake. Batteries used either as starters or emergency electrical systems should be stored in low profile battery racks and adequately anchored to the floor to prevent sliding and overturning. Battery rack frames should have sufficient strength to withstand lateral loads from the batteries. A noncorrosive padding should be placed between each battery and between the batteries and side support rails to prevent relative movement between the batteries./54/

Measure	Alternative	Description
		– Install emergency communication equipment, such as two-way radios or microwave equipment. – Brace, anchor, and protect non-structural components.
K.19	A,B,N	Build a mass care facility, which would incorporate a helipad. It should also have an auditorium, cafeteria, and restrooms. If a school is built in the Project Area, design it to serve as a mass care facility accessible from all parts of the Project Area. Equip the mass care facility with medical supplies and provisions for emergency medical care available within the Project Area. Design community facilities and public buildings for administering emergency services to supplement the primary mass care facility. Supply the mass care facility with food, water, and supplies to last three days.
K.20	A,B,N	Provide cisterns in the Project Area to store water and pumps to use Bay water for fighting fires.
K.21	A,B,N	Store within the Project Area heavy equipment that could travel on damaged roads, clear debris, and open access to the Project Area after a major earthquake.
Damage to Infrastructure		
K.22	A,B,N	Construct infrastructure features with redundancy and flexibility to prevent failure during a major earthquake. Specifically:/54/ – Provide another east-west access road, constructed on seismically stable ground or on fill engineered to be stable, to the site under I-280 in addition to 16th Street where I-280 has been determined to be safe from danger of

Measure	Alternative	Description
		collapse. Alternatively, do a detailed seismic analysis of I-280 at 16th Street and retrofit it as necessary so that it would not cause 16th Street to be impassable after a major earthquake. – Perform remedial strengthening and repair on the Third and Fourth Street bridges. – Prepare contingency plans to ensure that emergency repairs to the bridge approaches can be made promptly. – Place MUNI Metro tracks west of the zones where settlement of more than two inches is expected where feasible. – Provide good anchorage for all electrical system components such as transformers and switchgear. Where relative movement is likely to occur between equipment, flexible connections or slack should be used to accommodate differential displacement. Slack should also be provided in underground cabling when it is installed. – Use flexible couplings or welded steel pipe for pipelines. For communications conduit, steel usually performs better than polyvinyl chloride. Ductile iron and steel perform much better than cast iron or concrete pipes for drinking water supply or sewers. – Ensure that state-of-the-art information is applied to the design of infrastructure.
K.23	A,N	Perform seismic rehabilitation of vacant Firehouse 30 at Third, Fourth, and Mission Rock Streets.
K.24	A,B,N	The following pertain to the use of hazardous materials at Mission Bay:/55/ – Prohibit storage or handling of hazardous materials in buildings that do not meet acceptable levels of safety. New buildings, if constructed as recommended in Mitigations, K.9, K.10, and K.11, should be structurally sound.

Measure	Alternative	Description
		– Maintain an inventory at the San Francisco Fire Department of hazardous materials as required by AB 2185.
		– Conduct periodic inspections of non-structural features of buildings in which hazardous materials are located. Non-structural hazard mitigation in this special case should include proper maintenance and contingencies for power loss. It could also include, if appropriate, seismic restraints, special pipe connections, safety shutoffs, special gas storage tanks, and secondary containment.

NOTES

SETTING

/1/ Dames and Moore, Preliminary Report, Geotechnical Consultation, Mission Bay Development, San Francisco, California, April 15, 1982.

/2/ Dames and Moore, Geotechnical Consultation, Mission Bay Project, December 1, 1982.

/3/ Harding Lawson Associates, Stadium Feasibility Analysis: A Study of Alternatives for a Stadium for the City of San Francisco, v.1, Research and Data, Appendix D, Geotechnical Site Evaluation Reports, 1983.

/4/ San Francisco datum is a local reference elevation equivalent to about 8.6 feet above mean sea level.

/5/ Wahrhaftig, Clyde, A Streetcar to Subduction and Other Plate Tectonic Trips by Public Transport in San Francisco, Revised Edition, American Geophysical Union, 1984.

/6/ Serpentine minerals and rocks are alteration products of rocks which formed deep in the earth. They have been squeezed up to the surface by the collision of immense plates of the earth's crust when one plate is subducted under another. Melange is a mixture of crushed fragments of all the rocks brought together during subduction.

/7/ Goldman, Harold B., editor, "Geology of San Francisco Bay," Geologic and Engineering Aspects of San Francisco Bay Fill, California Department of Conservation, Division of Mines and Geology, Special Report 97: 11-29, 1969, p. 18.

/8/ Robert Darragh, Dames & Moore, telephone conversation, June 4, 1987.

/9/ Schlocker, Julius, Geology of the San Francisco North Quadrangle, California. U.S. Geological Survey, Professional Paper 782, 1974.

/10/ Overconsolidation is the decrease of void space between grains which is greater than the present load would cause. It usually results from desiccation of the sediments or from pressure which has since been removed. In the case of old bay clay, the overconsolidation was caused by a lowering of sea level and subsequent drying of the clay.

/11/ Pile-supported sewers are the following: Sixth Street Sewer from Channel south halfway to 16th Street; C-4 Sewer along the south side of the Channel between Fourth and Sixth Streets; 16th Street Sewer from Owens to Third Streets; Berry Street Sewer from Fourth to Seventh Streets; and the Fourth, Fifth, and Sixth Street Sewers from Berry Street to Channel outfalls. Older pile-supported buildings include the old cold storage warehouse at China Basin Channel and Fifth Street, two buildings west and one building south of the cold storage warehouse, the Central Warehouse Company structure, the new magazine building west of Sixth Street, the boiler house on Townsend Street between Fourth and Fifth Streets, and the Pacific Motor Trucking garage at Sixteenth and Sixth Streets.

Information on the sewers was provided by Dan Champeau, Clean Water Program, telephone conversation, May 12, 1988.

/12/ Lee, Charles H. and Michael Praszker, "Bay Mud Developments and Related Structural Foundations", Geologic and Engineering Aspects of San Francisco Bay Fill, Harold B. Goldman, editor, California Department of Conservation, Division of Mines and Geology, Special Report 97: 43-85, 1969.

/13/ Active faults are those which have a historic record of activity or other geophysical evidence of movement within approximately the last 10,000 years.

/14/ Real, Charles R., Probabilistic Long-Term Forecasts of Major Earthquakes in the San Francisco Bay Region, Bay Area Earthquake Study, 1984.

/15/ The Richter Scale measures magnitudes of earthquakes based on the amount of energy released. It is a logarithmic scale, with each full point increase representing 30 times as much energy release as the previous point (for example, a magnitude 5 earthquake releases 30 times as much energy as a magnitude 4 earthquake). The Federal Emergency Management Agency has estimated that the 8.3 Richter magnitude is the estimated largest magnitude earthquake that could be expected to strike the Bay Area at a reasonable level of probability, and that the main shock can be expected to be followed by large aftershocks over a period of weeks or longer. Each large aftershock would be capable of producing additional significant damage and hampering disaster assistance operations.

/16/ San Francisco Department of City Planning, Downtown Plan Environmental Impact Report, EE81.3, 1984.

/17/ Ancient faults include the San Bruno Fault and the City College Fault Zone. In addition, several smaller inactive faults or shear zones are located near Telegraph Hill, Potrero Point, and the James Lick Freeway. Seismic events centered on the Maacama, Healdsburg-Rodgers Creek, Green Valley, Concord, Antioch, Greenville, and San Gregorio Faults are not expected to cause serious impacts in San Francisco.

/18/ Borcherdt, Roger D., James F. Gibbs, and Kenneth Lajoi, Predictions of Maximum Earthquake Intensities in the San Francisco Bay Region, California, for Large Earthquakes on the San Andreas and Hayward Faults, U.S. Geological Survey, MF-0709, 1975.

/19/ Perkins, Jeanne B., The San Francisco Bay Area -- On Shaky Ground, Association of Bay Area Governments, February 1987.

/20/ Groundshaking in San Francisco is classified on a five-point scale ranging from A (very violent) to E (weak).

/21/ Andrew C. Lawson et al., The California Earthquake of April 18, 1906: Report of the State Earthquake Investigation Commission, 2v and atlas, Carnegie Institution, Washington, D.C., 1908.

/22/ Blume, John A., San Francisco Seismic Safety Investigation, Geologic Evaluation, URS Associates, 1974.

/23/ Ground failure here includes liquefaction, subsidence, and lateral spreading. Liquefaction is the transformation of clay-free granular material, such as loose, wet sand, into a fluid-like state similar to quicksand. It occurs as a result of groundshaking during an earthquake. Subsidence is a lowering of the ground surface from settlement of the soil. This can occur from earthquake groundshaking, withdrawal of groundwater, or other causes. Lateral spreading is the horizontal movement of soil or fractured rocks when there is liquefaction or plastic flow of adjacent soil.

/24/ Glossary of Geology, Second edition, edited by Robert L. Bates and Julia A. Jackson, American Geological Institute, Falls Church, Virginia, 1980.

/25/ Garcia, A.W. and James R. Houston, Type 16 Flood Insurance Study: Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound, report prepared for the Federal Insurance Administration, U.S. Department of Housing and Urban Development, 1975.

/26/ J.R. Ritter and W.R. Dupre, Map showing potential inundation by tsunami in the San Francisco Bay Region, California, U.S. Geological Survey Miscellaneous Field Studies Map MF-480, 1972.

/27/ The Third Street Bridge does not need strengthening, but some rehabilitation is needed on the concrete piers. The Fourth Street Bridge has a high probability of being damaged in an earthquake because the counterweight tower and the main trunnion columns are severely overstressed. Remedial strengthening of the bridge structure and rehabilitation of its concrete support structures are necessary. Preliminary Earthquake Risk Assessment for Mission Bay Project: Background for Mission Bay Seismic Safety Special Study.

/28/ Thomas Jenkins, Acting Director, Office of Emergency Services, personal interview, March 28, 1988.

/29/ A Mass Care Facility is a location at which temporary lodging, feeding, clothing, registrations, welfare inquiry, first aid, and essential social services can be provided to disaster victims during the immediate/sustained emergency period.

/30/ A Multi-Purpose Staging Area is a preselected location having large parking areas and shelter for equipment and operators and which provides a base for coordinated, localized emergency operations, a rally point for mutual aid coming into an area; and a site for post-disaster population support and recovery activities.

IMPACT

/31/ These assumptions were made to provide a conservative estimate of material excavated. If the assumption that only buildings with superior seismic performance were constructed, it is likely that all would be pile supported and the amounts excavated would be greatly reduced. See Mitigation K.2, p. VI.K.45.

/32/ R.W. Barton, KCA Engineers, telephone conversation, May 27, 1987.

/33/ San Francisco Department of City Planning, September 1986, Soil Conditions, Mission Bay, San Francisco, Dames and Moore Memorandum Number 4.

/34/ The percentage of lot coverage is an estimate based on the assumption that building footprints would not cover the entire lot.

/35/ San Francisco Department of City Planning, September 1986, Canal Systems, Mission Bay, San Francisco, Section V, Mission Bay Canal Alternatives, KCA Engineers, August 1982.

/36/ CH_2M Hill, study prepared for Jefferson Associates, May 6, 1983.

/37/ R.W. Barton, KCA Engineers, telephone conversation, June 3, 1987.

/38/ San Francisco Department of City Planning, September 1986, Soil Conditions, Mission Bay, San Francisco, Dames and Moore Memorandum Number 5.

/39/ Sewers present an additional problem because the main collection sewers are pile-supported and are not settling. Therefore, sewers serving pile-supported structures have fixed elevations at each end, but subside with the soil elsewhere. There are therefore two connections which may be damaged by insufficiently flexible connections.

/40/ San Francisco Department of City Planning, "Seismic Safety," Special Study for Mission Bay," prepared by EQE, 1986.

/41/ Davis, James F., John H. Bennett, Glenn A. Borchardt, et al., Earthquake Planning Scenario for a Magnitude 8.3 Earthquake on the San Andreas Fault in the San Francisco Bay Area, California Department of Conservation, Division of Mines and Geology, Special Publication 61, 1982.

/42/ Steinbrugge, K.V. et al., Earthquake Planning Scenario for a Magnitude 7.5 Earthquake on the Hayward Fault in the San Francisco Bay Area, California Department of Conservation, Division of Mines and Geology, Special Publication 78, 1987.

/43/ EQE, Preliminary Earthquake Risk Assessment of Mission Bay Project: Background for Mission Bay Seismic Safety Special Study, prepared for San Francisco Department of City Planning, 1986.

/44/ Algermissen, S.T., W.A. Rinehart, James Dewey, et al., A Study of Earthquake Losses in the San Francisco Bay Area: Data and Analysis, National Oceanic and Atmospheric Administration report prepared for the Office of Emergency Preparedness, 1972.

/45/ Perkins, San Francisco Bay Area - On Shaky Ground, February 1987.

/46/ Association of Bay Area Governments, Building Stock and Earthquake Losses - The San Francisco Bay Area Example, May 1986.

/47/ Christopher Rojahn, Applied Technology Council, telephone conversation, February 16, 1988.

/48/ The nighttime earthquake is assumed to occur at 2:00 a.m. when most residents would be at home and no employees would be present. The daytime earthquake is assumed to occur at 2:00 p.m. and employees and unemployed residents would be affected.

MITIGATION

/49/ Charles H. Lee and Michael Praszker, "Bay Mud Developments and Related Structural Foundations," Geologic and Engineering Aspects of San Francisco Bay

Fill, Harold B. Goldman, editor, California Department of Conservation, Division of Mines and Geology, Special Report 97: 51-52, 1969

/50/ The 1987 San Francisco Building Code incorporates by reference major parts of the 1979 UBC. The UBC is updated every three years (the most recent version is dated 1985) and has been changing rapidly with respect to seismic standards.

/51/ Vitelmo V. Bertero, "Strength and Deformation Capacities of Buildings Under Extreme Environments", in Karl S. Pister, editor, Structural Engineering and Structural Mechanics, Prentice-Hall, Englewood Cliffs, New Jersey, 1977.

/52/ California, Seismic Safety Commission, Earthquake Safety: Potentially Hazardous Buildings. Report of the Committee on Hazardous Buildings, Report No. SSC 85-04. Sacramento, California, p. 16-19, November 1985.

/53/ Bay Area Regional Earthquake Preparedness Project, Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide, second edition. BAREPP 85-10. October 1985. p .15-29.

/54/ EQE, Preliminary Earthquake Risk Assessment of Mission Bay Project: Background for Mission Bay Seismic Safety Special Study, prepared for San Francisco Department of City Planning, 1986.

/55/ Code of Federal Regulations, Title 40, Chapter 1, Subchapter J, Section 300.68.

L. HYDROLOGY AND WATER QUALITY

SETTING

HYDROLOGIC HISTORY

Mission Bay was once an extensive shallow bay, which had an average depth of one foot at mean low tide. Large areas of tidal flats formed the landward side of Mission Bay. Extensive areas of salt marsh with at least three marshy sloughs reached far inland from the tidal flats. Fresh water drained into Mission Bay from springs on nearby Rincon Hill and from Mission Creek, which maintained a year-round flow.

Between 1865 and 1913, Mission Bay was gradually filled in, and diverse industries and businesses located on the reclaimed land (see VI.J. Cultural Resources, p. VI.J.6). The present China Basin Channel is the last remnant of Mission Creek and Mission Bay. Dredging, shipping activities and wastewater overflows have degraded water quality in the channel./1/

WATER QUALITY MANAGEMENT POLICIES FOR THE PROJECT AREA

State policy for water quality control in California is directed toward achieving the best water quality consistent with the maximum benefit to the people of the state. Beneficial uses of surface waters, groundwaters, marshes, and mud flats for the Project Area are identified in the Water Quality Control Plan, San Francisco Bay Basin, as adopted the by San Francisco Bay Regional Water Quality Control Board and approved by the State Water Resources Control Board. The regulatory background concerning the Basin Plan is described in VI.A. Public Plans, Policies and Permits, p. VI.A.26. The plan has established water quality objectives and discharge prohibitions to attain water quality goals and to protect beneficial uses./2/ Beneficial uses defined for central San Francisco Bay are summarized below. Water quality objectives from the Basin Plan are given in Appendix J. Hydrology and Water Quality, Table XIV.J.1, p. XIV.J.1.

Under stipulations of the Water Quality Control Plan, water quality within China Basin Channel can be maintained at a lower level than would normally be expected. The plan states that "The level of protection that was accepted is less than Maintenance Level C . . ." for the areas of wet weather overflows such as China Basin Channel./3/ Maintenance Level C is the lowest maintenance level which applies to "areas where water quality or aquatic productivity may be limited due to the pollution effects of a dense human population or other urban activities which are largely uncontrollable. Such areas may include some shipyard and harbor areas."/4/

Beneficial Uses - Central San Francisco Bay/2/

Some of the beneficial uses defined by the Basin Plan for Central San Francisco Bay are not found in China Basin Channel, but may exist in adjacent waters. The Water Quality Control Plan recommends that water quality in the channel be improved to and maintained at a level that will allow any of the following beneficial uses defined for the area even if such uses currently do not occur there:

- Industrial process supply - Includes process (cooling) water supply and all uses related to the manufacturing of products;
- Navigation - Includes commercial and naval shipping;
- Water contact recreation - Includes all recreational uses involving actual body contact with water, such as swimming, wading, etc., where ingestion of water is reasonably possible;
- Non-water contact recreation - Recreational uses that involve the presence of water but do not require contact with water, such as picnicking, sun bathing, pleasure boating, etc.
- Commercial and sport fishing - The commercial collection of various types of fish and shellfish, including those taken for bait purposes, and sport fishing in non-fresh water areas;
- Wildlife habitat - Provides a water supply and vegetative habitat for the maintenance of wildlife;
- Preservation of rare and endangered species - Provides an aquatic habitat necessary, at least in part, for the survival of certain species established as being rare and endangered species;
- Fish migration - Provides a migration route and temporary aquatic environment for anadromous or other fish species;
- Fish spawning - Provides a high-quality aquatic habitat especially suitable for fish spawning;
- Shellfish harvesting - The collection of shellfish such as clams, oysters, abalone, shrimp, crab and lobster for either commercial or sport purposes; and
- Estuarine habitat - Provides the habitat that serves to acclimate anadromous (seagoing freshwater) fishes during migration, and provides for the propagation and sustenance of a variety of fish and shellfish, numerous waterfowl, shore birds, and marine mammals.

Navigation and non-contact water activities, including boating, occur on the channel. Recreational fishing has been observed there, although it is not known if fish are consumed. Water contact recreation in the channel is minimal or non-existent. As discussed in VI.M. Vegetation and Wildlife, pp. VI.M.1-VI.M.6, the following beneficial uses occur at the site: wildlife habitat, preservation of the rare and endangered brown pelican, fish spawning and estuarine habitat. No waters are known to be directly extracted for industrial uses. No surface water or groundwater is used as a water supply for domestic or industrial purposes.

RUNOFF

Site Drainage Characteristics

Runoff is generated in the Project Area when rainfall runs off of impermeable surfaces such as rooftops and paved areas. Compacted soils on land that has been used for parking, railroad, and industrial uses generate substantial runoff. Runoff from most of the Project Area is collected in the storm drains connected to the City's combined sanitary sewage/stormwater collection system. The system is described in VI.D. Community Services and Infrastructure, Sewers and Wastewater Treatment, p. VI.D.24. In the area of China Basin Channel, stormwater from north of the channel is collected in a large (18 feet by 18 feet) sewer along the Embarcadero and Berry Street. Flows from south of the channel are collected in a storage sewer along the south edge of the channel before being pumped to the Southeast Water Pollution Control Plant. During major storms, the storage capacity of the sewers is exceeded and combined flows of sewage and stormwater overflow into the channel. The overflows are discussed below under China Basin Channel.

In some unpaved areas rainwater can soak into the soil and reach groundwater. Portions of Mission Bay near the channel and Bay drain directly into those waterbodies rather than into the stormwater collection system.

The peak quantity of runoff from the Project Area under existing conditions has been estimated by use of the Rational Method to be about 436 cubic feet per second (cfs) during a five-year storm./5/ This methodology is described in Appendix J. Hydrology and Water Quality, p. XIV.J.3, and the results of the analysis are summarized in Table XIV.J.2, p. VI.J.4.

Runoff Quality

The combined stormwater/sewer system carries wastewater and runoff from areas throughout the City, including the Project Area, which is largely industrial. Many industries in the Project Area use, handle and store chemicals, and generate a variety of chemical wastes or by-products (see VI.N. Hazardous Wastes, p. VI.N.14). Deposition of chemicals (solvents, fuels, waste materials) through accidental spills or storage and disposal may result in contamination of soils, groundwater, and surface runoff. Petroleum products are of concern, especially during fueling operations. Intentional and illegal dumping of chemicals also undoubtedly has occurred. The low nighttime population of the area may attract "midnight dumping" by unknown persons of materials into the stormdrain intakes and gutters. Materials also may leak into ground and surface waters from drain and sewer collection systems.

Street surfaces are collection areas for pollutants which contaminate runoff and receiving waters. Local soil erosion and motor vehicle emissions and use deposit pollutants on street surfaces. Most of these materials are probably carried by surface runoff to the storm drains.

FLOODING

The 100-year high tide (the height which is equalled or exceeded with an average frequency of once every 100 years) would reach an elevation of about -2.0 feet San Francisco Datum (SFD) (see note/4/ in VI.K. Geology and Seismicity, p. VI.K.57, for definition). The elevation of most of the site is above +5 feet SFD, which provides several feet of protection against inundation from expected high tides.

GROUNDWATER

Most of the Project Area is underlain by heterogenous fills of highly variable character and permeability. Thicknesses range up to 57 feet, and average 18 feet. Fills resting on Bay Mud vary considerably and range from clean sands to rubble and materials which may be contaminated with hazardous substances./6/ Geology of the Project Area is discussed in VI.K. Geology and Seismicity, p. VI.K.2; Hazardous wastes are discussed in VI.N. Hazardous Wastes, beginning on p. VI.N.5.

Depth to groundwater, measured in borings in 1983, ranged from 3.5 feet to 9 feet below the ground surface. In general, the groundwater table elevation coincides with the mean water level, or mean sea level, in adjacent San Francisco Bay./6/ Testing of water samples from seven water quality monitoring wells located throughout the Project Area west of Third Street indicated that the groundwater is brackish (water with a salinity between that of non-saline freshwater and sea water) and appeared to be contaminated with sewage. The brackish nature of the groundwater could be a result of intrusion of San Francisco Bay water into the freshwater./7/ While coliform counts were far in excess of standards for municipal water supplies, there are no uses of groundwater at Mission Bay. Groundwater in the Project Area likely contains trace amounts of some hazardous materials deposited on the surface or in the soil over the past 125 years by industries operating in and adjacent to the Project Area. Although groundwater in the Project Area has not been tested yet for such materials, hazardous toxics (those that will dissolve in water) could have moved down through the fill with rainfall, percolating to groundwaters. Materials recently carried by runoff from the general vicinity and deposited in the China Basin Channel (see discussion on p. VI.L.10) are a good indication of the extent and nature of surface contamination in the Project Area; analysis of those materials shows widespread metal, petroleum product, and chemical contamination. The water samples were not tested for hazardous materials.

Underground storage tanks are potential sources for contaminant release into surrounding soils and groundwater. Aging or improperly designed and maintained tanks may release their contents to the subsurface environment, and generally do so undetected. The degree of contamination depends on several factors including pollutant characteristics, soil type and thickness, depth to groundwater, and hydrologic characteristics of the site.

UNDERGROUND STORAGE TANKS

Forty-nine underground storage tanks are known to have been installed within the Project Area in the past; due to an on-going tank removal program by landowners within the Project Area, about 13 of these tanks have been either abandoned in place or removed as of June 1988. Many of the tanks were or are used to store gasoline (about 14) or diesel fuel (about 18), but the contents of many tanks (about 17) are unknown. The typical tank in the Project Area has a capacity of 5,000 gallons and has been in place for over 15 years./8/ An unknown member of unlisted tanks also may be in the Project Area.

CHINA BASIN CHANNEL

Hydrology

China Basin Channel is tidal and extends northeast from near Seventh Street to China Basin, between Pier 46 and Pier 48. The channel parallels Berry Street and is approximately 5,300 feet long and 200 feet wide. The bottom of the channel ranges in elevation from approximately -11.6 feet San Francisco Datum (SFD) at its southwest end to a depth of -38.6 feet SFD at China Basin. The average bottom elevation of the channel ranges from approximately -21.6 feet SFD in the southwestern half to about -31.6 feet SFD in the northeastern half. The tidal range within the channel is approximately 6.3 feet, with mean lower low water (MLLW) at -11.6 feet SFD and mean higher high water (MHHW) at -5.3 feet SFD./9,10/ The mean tidal prism (the volume of water moved in and out during a mean tidal cycle) is large compared to the total volume of the channel, providing good tidal circulation at the China Basin end of the channel, even though the channel is a dead-end and the west end is shallow. Another factor promoting water circulation is that the channel discharges into San Francisco Bay at a location where tidal currents are strong. Tidally induced circulation is reduced during neap tides (tides of lowest range) because tidal flushing is then weakest. Conversely, tidal flushing is most effective during the spring tide period (tides of highest range). At present, the channel is shallow; since dredging is not now employed, it will eventually develop into mudflats, impeding outflow from the sewer outfalls./9/ Sedimentation rates of approximately six inches per year occur in the channel where the bottom is lower in elevation than about -22 feet SFD. As channel depth decreases, the sedimentation rate apparently decreases to about three inches per year.

Water Quality

Little water quality information for China Basin Channel is available, but a general assessment done for the Bayside Overflow Study indicates that the upper end of the channel has low dissolved oxygen levels, pH ranging from 7 to 8 (neutral to slightly basic), and total coliform counts of 200 to 500 MPN per 100 ml (most probable number per 100 milliliters)./11/ Coliform bacteria are bacteria found in soils and in the intestinal tract of warm-blooded animals; they are used as a standard indicator of potential sewage contamination. Water quality standards for coliform have been established by the RWQCB for water contact recreation as having a median value of less than 240 per 100 ml with no sample to exceed 10,000 per 100 ml.

Sewage/Stormwater Overflows

The combined stormwater/sewer system collects both stormwater runoff and municipal wastewater sewage. It is operated by the Clean Water Program (see VI.D. Community Services and Infrastructure, Sewers and Wastewater Treatment, p. VI.D.24). When collection and treatment systems are overloaded, as during heavy rains, untreated wastewater overflows into the channel at six outfall structures along the channel as well as the outfall of the Division Street Sewer at the southwest end of the channel. The Master Plan developed by the City and County of San Francisco to treat its wastewater, as accepted by the San Francisco Bay Regional Water Quality Control Board (RWQCB), allows for some overflows of minimally treated wastewater during wet weather.

Clearly, these overflows affect the water quality of the channel. However, at present, the level and type of water pollution within the channel have not been defined, although the Clean Water Program conducts some tests of the overflow waters being discharged to the channel. Runoff from the Project Area also may add pollutants directly to the channel. Available information does not allow an assessment of relative contributions to the contaminants found in the channel from groundwater, surface runoff, and/or overflows. Water entering the channel from the bay probably contributes relatively little to the contaminant load, although the effect of its salinity promotes precipitation of clay particles in the channel with any adsorbed pollutants.

Sampling of Overflows

Composite water samples were collected in 1979 at overflow structures during overflow events to characterize combined sewer overflows./11/ Those data are described in more detail in Appendix J. Hydrology and Water Quality, p. XIV.J.5. Constituents in combined sewer overflows include bacteria, suspended solids and ammonia found in sanitary sewage, but generally at lower concentrations because of dilution by stormwater. Concentrations in the overflows varied widely for most constituents./11/ The Clean Water Program currently samples the composition of the overflows for settleable solids, pH, total suspended solids, grease and oil, conductivity, and biochemical oxygen demand as well as bacteria, and ammonia. The overflow sampling points are located along the channel in the Fifth Street and the Sixth Street structures. Appendix J. Tables XIV.J.3, XIV.J.4, and XIV.J.5, p. XIV.J.9–XIV.J.11, give data from 1987 sampling of the overflows. Constituents found in the overflow water are generally lower in concentration than those found in untreated domestic wastewater, but exceed standards for municipal use, water contact recreation and shellfish harvesting./12/ Water quality measurements, objectives, and standards are discussed in the following paragraphs.

Impacts of Overflows on Water Quality

Detailed discussion of the impacts of overflows on the water quality of China Basin Channel are given in Appendix L. p. XIV.L.6. A summary of that discussion is given below.

Sewage / stormwater overflow discharges typically occur during winter and spring. During storm periods of high runoff, large overflow discharges can occur that fill the channel before tidal action can dilute and disperse them. A typical maximum annual discharge event is on the order of 200 to 300 acre-feet. The San Francisco Clean Water Program reported 15 overflow events in the channel during the 1985-1986 wet weather period. With improvements now being completed, the City estimates that discharges will be reduced to a frequency of about 10 per year./9,12/

When storm-induced sewer discharges occur, pollutants in the sanitary sewage are diluted by stormwater. In addition, large discharges generally occur during the low sun period when water temperatures and solar radiation are low and dissolved oxygen levels are high. Little biological activity is occurring in the channel during that time of the year, so biochemical consumption of dissolved oxygen is reduced.

Pollutants in the overflows can be dispersed in the channel by tidal action as well as flows induced by water density stratification. The latter process results because of the marked differences in salinity of the overflow discharge and saltwater. The freshwater of the overflow has approximately 1% of the salinity of the Bay water and, therefore, a lower density. During overflows, the sewage/stormwater discharge flows on top of the channel's saltwater with only partial mixing. This flow of the top water induces a counter current in the deeper Bay water; the net water movement can be many times greater than the overflow discharge rate itself. This overall water movement, then, accelerates flushing of pollutants out of the channel./9/

Continuous dye release at the Division Street overflow in 1979 revealed a 10:1 dilution ratio by the time the dye reached the Third Street Bridge. Approximately 11 hours after the dye release ended, dilutions within the channel were 100:1. The dye dilution profiles indicate that the waste-field stays within the top three feet under these conditions./9,11/ Sampling in the channel during and following overflows found that salinity gradients generally return to normal within about 24 hours./9/

The most serious water quality problems can develop when the density stratification is destroyed and the channel becomes completely mixed. This could occur if the discharge were appreciably colder than the salt water, increasing the density of the overflow waters (and causing them to sink and mix with the channel saltwater); if the salt water were already diluted by flood flows, so that its density were decreased; or if wave and current actions were to mix the water physically./9/

Concentrations of coliform bacteria also increased in the channel when overflows occurred. The coliform bacteria concentrations in the channel during overflows, which were on the order of 1 multiplied by 10^6 MPN per 100 ML, were diluted by about 10:1 at the end of the pier line at the Bay. After overflow events, bacteria concentrations decreased quickly. Channel concentrations of coliform were reduced by 90% in about 24 hours./11/

Generally, dissolved oxygen concentrations were only slightly affected by overflow events. Background dissolved oxygen concentrations were found to be normal (generally assumed to be no less than 5 mg/l, the RWQCB standard), according to the Bayside overflows study, at a sampling station near the Third Street Bridge, indicating that the low dissolved oxygen content which was found in the channel may exist only near the shallow end of the channel. The generally low dissolved oxygen concentrations in the shallow end of the channel are probably related to oxidation of solids which settle from the overflows to the channel bottom.

Ammonia as nitrogen values ranged from 0.94 to 8.37 mg/l with an annual mean of 2.09 mg/l for the 1985-86 season. The mean for 1986-87 was 4.64 mg/l, with values ranging from 0.59 to 17.3 mg/l./12/ RWQCB objectives for ammonia are 0.025 mg/l as an annual median, with the maximum at any one time not to exceed 0.16 mg/l.

The RWQCB does not set objectives for concentrations of heavy metals (such as chromium, lead, mercury, nickel, zinc) for surface waters which are not used for municipal supply or agriculture. However, there are toxic material effluent limitations for the sewers which discharge to inland surface waters. During overflow events in

January through March 1987, the limits for chromium (daily maximum limit 0.01 mg/l was exceeded twice. Nickel (daily maximum limit 0.2 mg/l) and silver (daily maximum limit 0.04 mg/l) limits were exceeded once each./12/ None of the heavy metal concentrations tested is above its Soluble Threshold Limit Concentration for hazardous waste./13/

Impacts of Overflows on Sediment Quality

The bottom sediments of China Basin Channel were assessed in a 1979 study./11/ Results of bulk sediment analyses of the upper six inches of sediment are given in Appendix J. Hydrology and Water Quality, Table XIV.J.6, p. XIV.J.12. Test results indicated that the combined sewage/stormwater overflows are potentially significant point sources for the introduction of metals, oil and grease, sulfides, chlorinated hydrocarbons, and petroleum products (hydrocarbons) to the sediments of the channel. Comparing sediment constituent values for the sample locations in the channel, an increase in metals, organic carbon, oil and grease, sulfides, and chlorinated hydrocarbons is evident at locations closer to the overflow structure at the head of the channel. Levels of cadmium, copper, zinc, mercury, organic carbon, sulfide, and Aroclor (a brand name for a PCB product) are all far above background levels; chromium, silver, arsenic, and nickel are also present in concentrations above background levels./9/ While levels of these materials do not exceed any current standards, lead, DDD, and DDT concentrations may exceed the state's Total Threshold Limit Concentration (TTLC) values for hazardous wastes./14/ Water movement induced primarily by tidal flushing is important in dispersing and removing contaminants from the channel; however the relatively impeded circulation at the upper end of the channel has limited capability to do so./9/

Ongoing Water Quality Sampling

In addition to the sampling program conducted on overflow events, the San Francisco Clean Water Program conducts ongoing monitoring of the waters in China Basin Channel at three stations located at the northeast corner of the Third Street Bridge, near the Fifth Street overflow structure, and near the Seventh Street overflow structure. Currently, the channel is sampled weekly for total coliform bacteria; ammonia is measured once per month during dry weather and up to twice per month during wet weather. Temperature, dissolved oxygen, conductivity and pH are generally sampled twice per month./15/ Water quality data are summarized in Appendix J. Hydrology and Water Quality, Table XIV.J.5, p. XIV.J.11.

The data reveal occasional violations of the state water quality objective for dissolved oxygen set at five milligrams per liter (mg/l). The data are not reported in a form which allows detailed determination of conformance with bacteria standards; however, the measured values indicate that, including both wet and dry periods, the water contained greater than 1,000 MPN total coliform/100 ml at least 19% of the time. This value is far in excess of the standards for water contact recreation, shellfish harvesting, and municipal supply. Ammonia values ranging from 0.04 to 1.1 mg/l have been measured in the channel; the source of this ammonia is not known./16/ The RWQCB objective for ammonia is 0.025 mg/l annual median; the maximum at any one time is 0.16 mg/l.

Houseboats

Houseboats berthed in China Basin Channel are a potential source of water pollution. The houseboats on the south side of the channel are served by the local sewer system; those on the north side are not. There is potential for some direct discharge of pollutants into the Channel through accidental spills or actions such as washing of decks, although the source is likely to be small.

Sediment Characteristics in the Channel

The sediment in the channel is composed of settleable solids derived from combined sewage overflows and the settling of materials suspended in waters entering the channel from the Bay. The bottom sediment particle size distribution data are presented in Appendix J. Hydrology and Water Quality, Table XIV.J.5, p. XIV.J.11, as the percentage of sand, silt, and clay. Reduced physical velocities and currents within China Basin Channel, as compared to the Bay, allow the settling of all particles, as indicated by the large fraction of silt and clay sediments at the Third and Fourth Street sample sites. The variability in particle size distributions from the different samples taken at each station is important to changes in sediment chemistry parameters over time. Fine-grained sediments like silt and clay readily can adsorb materials, such as silver, cadmium, copper, iron, lead, selenium, zinc, oil and grease, and chlorinated hydrocarbons, as is shown in the sediment analysis in Appendix J., Table XIV.J.6, p. XIV.J.12. When these materials are adsorbed onto the suspended sediments, they subsequently settle into the bottom mud and become trapped within the channel, rather than being dispersed and diluted in the water. Sediment testing generally reveals that 1979 China Basin Channel sediments contained higher levels of inorganics than other location of the Bay studied in the past three years (see Table XIV.J.6, p. XIV.J.12). The presence of these materials in sediments indicates water conditions which are not conducive to healthy aquatic biological communities (see VI.M. Vegetation and Wildlife, p. VI.M.4).

IMPACT

This section discusses the impacts to hydrology and water quality which could result from development of the Alternatives. Construction impacts are described first. It is important to note that they should not be considered temporary impacts because there likely would be construction occurring over a 30-year period, although the intensity of activity would vary over time. Following the discussion of construction impacts, there are explanations of impacts relevant to surface runoff, flooding, groundwater, China Basin Channel, and development of wetlands. In each case, hydrologic and water quality issues at build-out (in the year 2020) are discussed. Following the general discussion which covers impacts of all alternatives, specific details appropriate to each alternative are described.

CONSTRUCTION

Most of the site is flat, with low erosion potential in its undisturbed state. However, site clearance and cut and fill operations would expose large areas of the Project Area to erosion. Sheet erosion would occur on the flat areas. In the short-term, that could increase suspended solids concentrations in the sewer system, channel, and Bay. Erosion could result in conflicts with San Francisco Bay Regional Water Quality Control Board (RWQCB) criteria for suspended material, settleable material, sediment, turbidity, and toxicity. The criteria for constituents are listed in Appendix J. Hydrology and Water Quality, Table XIV.J.1, p. XIV.J.1.

Construction activity, including truck and heavy equipment traffic, tends to spread soil onto surrounding roads and walkways. Much of this material would be washed into storm drains during rain storms or if water were used to wash down the vicinity of building sites. More seriously, erosion could occur were soil stored on the site in piles or if surcharges were used. The magnitude of soil losses from a site being surcharged or used for soil storage would depend primarily on the area covered by the soil; slope of the soil; soil characteristics such as grain size, compaction, and surface texture; kind of vegetative cover; nature of erosion control measures; and amount and intensity of rainfall during its storage period. Applying the Universal Soil Loss Equation to the Project Area, one can calculate that during an average rainfall year, piles of sandy soil 20 feet tall would lose soil at a rate of approximately 130 tons of soil/acre annually./17/ Such storage piles probably would not cover large areas, but soil losses would be large if erosion control measures were not taken. Similar calculations for the sloped edges of surcharge piles five feet thick indicate that soil losses would be 110 tons/acre annually./17/ Total soil loss by Alternative cannot reliably be calculated because detailed grading plans are not available; these soil loss rates should not be applied on an annual basis to the Project Area as a whole. They apply only to the areas covered by storage piles or sloping sides of surcharges which would exist only for periods of one to, perhaps, three years.

Furthermore, because of past industrial activity in the Project Area, some of the soil in the Project Area contains elevated concentrations of contaminants. Erosion of that material could result in contaminated sediments in the sewer system, channel, and Bay. The Project Area may also contain undiscovered underground storage tanks, or other buried containers of liquid hazardous materials. If containers, some of which could be corroded or otherwise structurally unsound, were ruptured during excavation or removal, hazardous materials could be released to the soil and gradually enter the groundwater. This could also result in conflicts with RWQCB criteria for toxicity.

The Project Area is subject to the Hazardous Site Investigation Ordinance, which would require that the Project Area be investigated for hazardous wastes.

Alternative A

The total acreage cleared during development would be about 240 acres. During the initial phase of development, about 15 acres would be cleared.

Alternative B

The total acreage cleared during project development would be about 240 acres. The initial phase would include clearing about 14 acres for construction.

Alternative N

The total acreage cleared during development would be approximately 200 acres.

New development under Alternative N is expected to occur primarily in the area north of the channel and in the area south of the channel west of Third Street. The area south of the channel, east of Third Street, is expected to have less new development; thus, less grading would be required and, consequently, lesser short-term erosion impacts would be expected than under the other alternatives. As a result, water quality impacts related to sediments would be less than those under other Alternatives.

SURFACE RUNOFF

Runoff Amounts and Quality

Peak runoff would not change significantly under Mission Bay Alternatives (see Table VI.L.1). Following development, runoff would be collected in the San Francisco combined sanitary and stormwater sewer system. More specific features of the collection system are discussed in VI.D. Community Services and Infrastructure, Sewers and Wastewater Treatment, p. VI.D.24. The general pattern of runoff would not be altered significantly but the layout of the pipeline system would change. The San Francisco Clean Water Program has indicated that runoff expected by 2020 could be accommodated by the system without major changes to it./18/

New development would result in the elimination of existing pollution-generating activities in the Project Area. Existing and past industrial practices, parking, truck traffic, impound and other car storage sites and railroad activities, and other uses probably generate or have generated pollutants under existing or past conditions. To the extent that those sources of pollution would be removed and not replaced by other similar sources, an improvement in surface runoff water quality may be expected. Overall, it is not possible to draw specific conclusions on the comparative quality of runoff expected after development because of the conceptual nature of the many land uses that could occupy the Project Area and the general lack of precision in predicting the amounts, quality and concentration of nonpoint source runoff.

Most runoff from the Project Area would be generated by impervious surfaces such as roofs and paving. Runoff quality is expected to be similar to runoff from other areas of the City since land uses would include industrial, commercial, and residential uses. The land use of the area would be altered from existing industrial and railroad use to a mixture of residential, commercial and light industrial uses for Alternatives A and B. The pollutants in the runoff would generally be those generated by automobile traffic and local home and business occupants. The increased traffic in the area which would

---

TABLE VI.L.1: RUNOFF TO STORM DRAINS GENERATED BY ALTERNATIVES, 1985 AND BUILD-OUT/2020/a,b,c/

Land Use	C /d/	1985		Alt. A		Alt. B		Alt. N	
				Area	Runoff	Area	Runoff	Area	Runoff
		(ac)	(cfs)	(ac)	(cfs)	(ac)	(cfs)	(ac)	(cfs)
Office/Commercial/ Retail	0.9	NA	NA	39.2	62.5	13.2	25.8	6.9	10.9
S/LI/RD	0.8	NA	NA	50.2	82.8	6.0	10.2	NA	NA
Port-Related	0.9	NA	NA	6.5	13.3	NA	NA	NA	NA
M-2 Industrial	0.7	NA	NA	NA	NA	NA	NA	127.3	189.1
Port-Related/M-2	0.7	NA	NA	NA	NA	NA	NA	65.5	102.9
Existing Industrial	0.9	123.3	248.3						
Residential									
LDR	0.7	NA	NA	6.4	10.2	18.4	29.2	NA	NA
MDR, MHDR, and HDR	0.8	NA	NA	82.1	144.0	109.7	179.0	NA	NA
Community Facilities	0.8	0.6	1.1	2.4	4.4	5.6	9.9	0.8	1.5
Open Space									
Parkland	0.25	NA	NA	43.3	23.9	48.3	25.5	0.8	1.5
Wetland	0.25	NA	NA	NA	NA	33.8	NA	NA	NA
Gravel/Dirt	0.25	73.9	46.3	NA	NA	NA	NA	NA	NA
Rail (unpaved)	0.3	44.8	26.3	5.3	2.9	3.9	2.5	34.1	17.6
Freeway/Streets/ Rail (Paved)/ Parking/e/	0.9	66.8	114.0	77.1	136.7	73.6	131.0	72.7	136.3
TOTAL		309.4	436.0	312.5	480.7	312.5	413.1	308.1	459.8

---

ac - acre; cfs - cubic feet/second; NA - not applicable.

/a/ Area does not include 1.6 acres occupied by the Pumping Station or 15 acres occupied by the channel. The total area of 326 acres was used to conform with the area used by the City Clean Water Program in its estimates for runoff from the Mission Bay area.

/b/ The runoff for each Alternative is the total of the runoff generated in watershed sub-areas, each of which has a different design storm; therefore, runoff is not directly proportional to area. See Appendix J. Hydrology and Water Quality, p. XIV.J.3, for more information.

(Continued)

TABLE VI.L.1: RUNOFF TO STORM DRAINS GENERATED BY ALTERNATIVES /a,b,c/ (continued)

/c/ The areas on this table for various land use categories are not the same as those in Table V.2, p. V.9, because some areas generate runoff which flows directly into the Bay or the channel without entering the storm drains.
/d/ C = Coefficient of runoff. Coefficients were obtained from City Subdivision Regulations, the Clean Water Program, and Urban Stormwater Hydrology by David Kibler. See Appendix J. Hydrology and Water Quality, p. XIV.J.3.
/e/ Includes freeways which are elevated above other stated uses, such as railroad.

SOURCE: Environmental Science Associates, Inc.

---

accompany the changed use of the area would generate more pollutants such as oil, grease, and tire and exhaust residue. The local resident and employee population would generate litter and other debris. Landscaped open space would include the use of fertilizers, pesticides and herbicides. Pollutants that would be generated by future industrial uses are not known because specific uses are not defined, although heavy industrial uses would not be developed. The potential would exist for spills of unknown composition and discharges of pollutants in wastes that flow into the sewer system. Some of these could include toxic and hazardous materials.

Except during overflow events, about 80% of the stormwater collected at the Southeast Water Pollution Control Plant receives secondary treatment (85% to 90% of particulates removed) and 20% receives primary treatment (50% of the particulates removed)./19/ About 90% of the metals and most of the organic hydrocarbons show a strong affinity for the particulates. Therefore, when the particulates are removed during treatment, the attached metals and hydrocarbons are removed. This means that at least 10% to 15% of the contaminants are likely to remain in the water after secondary treatment and more than 50% after primary treatment./19/

Runoff would be discharged into the stormwater/sanitary sewer system and would be mixed with runoff from other areas of the system before being transported to the Southeast Water Pollution Control Plant for treatment (or discharged untreated to the channel during an overflow event). Therefore, any change in quality of the runoff from the Project Area reaching the Bay would be expected to occur under circumstances of an accidental spill of hazardous materials or during overflow events.

Although subject to regulation and enforcement of the RWQCB, new industrial or research and development users of the property might discharge certain unauthorized chemical compounds into the sewer system. This is discussed in VI.D. Community Services and Infrastructure, Sewers and Wastewater Treatment, p. VI.D.105. During storm events, pollutants from those unauthorized discharges could flow directly into the channel and the Bay. The pollutants would be diluted with stormwater, but could add to overall pollutant loadings to the Bay.

Table VI.L.1 summarizes the expected runoff at build-out from the Project Area under each Alternative. The methodology used for this analysis is discussed in Appendix J. Hydrology and Water Quality, p. XIV.J.3.

Alternative A

Runoff under Alternative A is estimated to be about 480 cubic feet per second (cfs) at full build-out/2020 using worst-case assumptions of ground cover by impervious surface. This is about 10% greater than runoff from the Project Area under existing conditions. The Clean Water Program has indicated that the existing sewer system can accommodate the increased runoff; however it will review specific plans, generally, south of the channel and south of 16th Street, to determine that the actual expected runoff could be accommodated./18/

Alternative B

Runoff under Alternative B at full build-out is estimated to be about 413 cfs under worst-case assumptions for runoff generation, that is, about 95% of existing peak runoff and less than that under Alternative A. The larger amount of open space in Alternative B accounts for most of the difference because open space allows more water to infiltrate into the soil than impervious areas that generate more runoff flowing into the sewer. The runoff could be accommodated by the existing system. Runoff quality would be similar to that described for Alternative A. Pesticides, herbicides and fertilizers may be of higher concentrations under this Alternative because of the larger area of parkland.

Alternative N

Estimation of runoff generation under Alternative N is more difficult than for the other Alternatives because development plans are less specific. Under most-conservative assumptions (that is, that runoff from all of the area would be collected in the sewer system and that most of the area would be paved) runoff is estimated to be about 460 cfs. That also assumes that some areas that are now impervious will remain so. That is about 6% more than the existing setting.

Alternative N would result in larger numbers of industrial users and a greater potential for the future use of hazardous materials.

FLOODING

If structures or roadways were placed at elevations at or below -2.0 feet SFD, after settling on the site, they could be subject to tidal flooding during the 100-year event. As most of the site is at elevation +5.0 feet SFD or higher, flooding would not be expected to affect the structures even following settling./20/

GROUNDWATER

Groundwater Levels

Groundwater levels in the Project Area may be expected to occur between depths of three to nine feet below the ground surface./6/ Dewatering could be required to make excavation possible. Dewatering could also be required in conjunction with cleanup of hazardous waste contamination of groundwater, although extraction and reinjection is more likely than dewatering. The degree of dewatering needed for cleanup of contaminated groundwater, if any, is unknown. Dewatering would stimulate additional saltwater intrusion into the dewatered areas as salt water flowed in to replace the water that was pumped out. The net effect, however, could be improved water quality if the hazardous wastes were found and removed. Dewatering is discussed in VI.K. Geology and Seismicity, p. VI.K.30.

Groundwater Quality

Underground storage tanks for various chemical compounds, including potentially toxic substances, exist or have existed at the site. Buried drums containing liquid hazardous materials could remain in the Project Area. Past industrial uses of the site and filling with contaminated soils or hazardous wastes could have contaminated some of the soil in the Project Area. If underground structures have leaked or are leaking, contaminants have already been introduced into the groundwater. Of the four general types of hazardous wastes (reactive, ignitable, corrosive, and toxic), materials that are exclusively reactive, ignitable, or corrosive would not be expected to be present in groundwater; their non-toxic hazardous properties would be neutralized by ambient (buffered and lacking oxygen) brackish-water conditions. Some hazardous materials in the toxic group, however, could have entered the groundwater as toxic pollutants. Metal ions, petroleum products, and chlorinated hydrocarbons are present in the sediments of China Basin Channel, and may be widespread pollutants in groundwater in the Project Area. Removal of leaking tanks, buried drums, and contaminated soils as part of project construction could improve groundwater quality. Because underground storage tanks and drums could be corroded and in poor structural conditions, however, removal also poses the risk of additional contamination from ruptured containers.

Following development, further degradation of groundwater quality probably would be reduced, although the magnitude of any improvement would depend on the extent of existing pollution, the exact nature of any new potential pollution sources and the control measures adopted as part of the project to reduce the potential for groundwater pollution. Industrial users of the site could employ a variety of chemicals in process and research and design work, ranging from metals and organics to radioactive substances. The major potential source of groundwater contamination would be storage of potentially polluting materials in underground storage tanks that might later leak. Newer tanks, and regulations being developed by the state and the EPA, would limit the leakage potential. There is no proposal for use of groundwater at the site. Contaminated groundwater would pose a hazard could if public and/or terrestrial and aquatic wildlife were exposed to contaminated groundwater. This could occur in a variety of ways, such as excavation to the water table, pooling of groundwater at the surface, seepage into below grade structures, or seepage into wetlands, parks, and the Bay.

Spills would be another pathway for groundwater contamination. Spills could occur during construction or from future industrial activity in the Project Area. Additional development on the Project Area would increase the amount of impervious surface in some portions of the site. In these areas, spills would not be expected to affect groundwater quality. It is not possible to predict the number or type of spills that could occur due to variations in the types of industries present, methods used for disposal of contaminants, and routes used to transport chemicals.

Infiltration of stormwater runoff or irrigation water can degrade groundwater quality. Because much of the site would be covered with impervious material and subject to minimal infiltration, this would not be a major cause of degradation. However, additional nutrients and pesticides or herbicides could be introduced to the groundwater beneath landscaped areas by infiltration of rainfall and irrigation water into the soil column. Whether this would represent a measurable change would depend on the existing conditions, the type of vegetation and the rate of application of such substances.

The groundwater at the site has been found to be brackish. The high salt content could cause accelerated corrosion of metal pipes and underground storage tanks. Corrosion could lead to leaks or failures in these pipes and resulting water quality degradation. Failure also means that the pipes must be replaced more frequently, increasing maintenance costs.

Alternative A

Alternative A would not be expected to have long-term effects on the overall water table elevation or the movement of groundwater because the groundwater level is largely a function of mean sea level. Infiltration would decrease under Alternative A, but the effects on groundwater probably would be insignificant. Dewatering during construction could temporarily lower groundwater levels locally.

Alternative B

The development of wetlands under Alternative B could affect local groundwater levels in the immediate vicinity by creating a direct connection between shallow groundwater and the channel. Depending on the relative elevation of wetland water level and groundwater table and the rate at which water moves in the soil, recharge or drainage of groundwater could occur. The larger area of parkland also would allow more infiltration of rainwater into the soil. These would be minor effects since the groundwater level, channel, and wetland would all be, on average, at mean sea level. No widespread change in groundwater levels would be expected because these levels are controlled by Bay water levels.

Construction of new wetlands might allow additional saltwater intrusion because the wetlands would be located farther inland than the existing channel or bay margin.

However, this would depend on the actual flow patterns at the site (that is, the movement of fresh water toward the Bay and saltwater inland). This would be expected to be a minor impact because the larger area-wide groundwater flow regime would not be altered substantially by wetland development. Other groundwater impacts would be the same as those for Alternative A.

Alternative N

Impacts on groundwater would be similar to those expected under Alternative A.

CHINA BASIN CHANNEL

Water Quality

As discussed on p. VI.L.6, the water quality in China Basin Channel depends on the overall hydraulics of the channel, the frequency of stormwater overflow events and the volume of overflows. Adequate data to evaluate the causes and extent of existing water quality degradation in the channel do not exist. Recent improvements in the sewer and stormwater management system are designed to limit overflows to ten per year; that would have a presumed beneficial effect on channel water quality but of an unknown magnitude. During the year from June 1985 to June 1986, there were 15 overflow events for a total of 98 hours./21/ The summary for 1986-87 operation of the North Shore and Channel Street Systems does not show the number of overflow events, but the Channel Street system overflowed for a total of 67 hours./22/ Analysis of water samples taken at five locations along the length of the channel indicates that coliform counts are high in channel water whenever an overflow event occurs. Dissolved oxygen measurements during both years were low at the west end of China Basin Channel. Composite samples taken during overflow events into China Basin Channel at Fifth and at Sixth Streets were analyzed for ammonia, biochemical oxygen demand, and total suspended solids. All were at levels which would be expected from primary treated sewage./12/

The overflow effects on water quality pose varying levels of constraint on the Alternatives. The adverse water quality conditions pose a minimal constraint to development of Alternative A since the channel serves primarily as a visual/aesthetic amenity feature. The primary constraints probably would be related to odors and reduced aesthetic appeal. Additionally, there may be some increase in public health risk (see below); however, water contact recreation and fishing are not specifically integrated into the Alternative A development plans. The adverse water quality conditions pose the greatest constraint to Alternative B, because they could possibly affect the viability of the proposed wetlands and their wildlife (see discussion below). As with Alternative A, there may be an inadvertent increase in public health risk. The overflow-related water quality conditions pose no constraint to Alternative N.

It is not possible to evaluate precisely the overall impact Mission Bay could have on water quality in the channel. However, land uses surrounding the channel have less direct influence on the water quality of the channel than the combined sewer overflows and the tidal hydraulics of the system, at least for non-toxic pollutants. Changes in land use would not of themselves have a direct, major effect on the water quality. Peak runoff would be only slightly increased with Alternatives A and N, and decreased with Alternative B; thus, the number or intensity of overflows in the City-wide system would not be increased significantly by any of the Alternatives. The following sections discuss those aspects of development that could affect water quality and the implications of existing channel water quality for certain proposed elements of the Alternatives.

Alternative A

Hydrologic Characteristics. The basic hydrologic characteristics of China Basin Channel would not be changed under Alternative A, but the edge of the channel would be modified. The outfall area would remain as a soft, natural edge with gabions. The edge treatment in the rest of the channel would include T-walls, decking and gabions on the north side and decking and gabions on the south side./23/ Partial edge treatment along the channel would be completed in the initial phase of development. The T-walls and gabions could improve the stability of the banks and prevent bank erosion in the channel to varying degrees, depending on the detailed plans for the edge treatment. The effects of the edge treatment on habitat value are discussed in VI.M. Vegetation and Wildlife, p. VI.M.7.

Major dredging of the channel could affect the circulation patterns in the channel and, in turn, water quality, although this is not the reason for which dredging is proposed (see below). The amount of dredging proposed would not be large enough to cause any long-term significant changes in circulation in the channel.

Water Quality Effects of Wet Dredging. The channel would be wet-dredged under Alternative A in the initial phase of development. Approximately 45,000 cubic yards of material would be wet-dredged from the channel to improve navigability at low tide./24/ Installation of T-walls to improve the appearance of the edges of the channel would require dry-dredging of an additional 85,000 cubic yards. The dredging plans have not been drawn; but it is likely that material would be removed from the north side of the channel near Fifth Street, where a mound of sediments has developed on the channel bottom. Dredging would be done where needed to deepen the channel by two to three feet. The dredging activity would last approximately two months. Additional maintenance dredging could be required in the future, although it is estimated by the project engineer that dredging would not be needed more frequently than once in every ten years. Most dredging would be done from shore with a dragline but some could require the use of a dredge rig in the channel./24/ Dredging and disposal of dredge materials are considered one process. A permit is required, as discussed below under Regulation of Dredge Spoils Disposal.

In general, wet-dredging causes elevated concentrations of suspended sediments at the dredge site as well as at the disposal location (if land disposal is not used). In both areas, an increase in turbidity of the water occurs for a short period. The amount of increase depends on the environmental conditions, including currents and existing turbidity in the site vicinity, and the method used for dredging. The increased turbidity from dredging in the channel could result in short-term violations of the state water quality objective for turbidity and some disturbance of aquatic ecosystems (see VI.M Vegetation and Wildlife, p. VI.M.14). Generally, turbidity levels return to pre-dredging conditions within several hours following cessation of dredging activities./25/

The effects of dredging would not likely extend into the Bay unless the dredging were done at a time of high sewage overflows which would lower the salinity and increase the amount of water flowing into the Bay from the channel. The high salinity of Bay water causes fine particles to form clusters which act like larger particles. They settle more rapidly than the same material in fresh water. Larger particles disturbed by the dredging would settle rapidly within the channel because of their weight and shape; the salinity of the water would have little effect on their behavior.

Material to be dredged in China Basin Channel contains high concentrations of organic matter and sulfides which are subject to oxidation./11/ When dredge materials rich in these substances are added to the water column, the material is oxidized, causing an immediate drop in local dissolved oxygen concentrations./25/ This is a temporary consequence of dredging which could cause temporary violations of the state water quality objective for dissolved oxygen. The impacts of decreased oxygen levels and increased turbidity are discussed in Vegetation and Wildlife p. VI.M.15.

A major concern related to dredging and disposal of dredged material is the potential for toxic contaminants such as lead and chlorinated hydrocarbons in the sediments to be released to the water column during dredging and for their long-term release to the water column at the disposal site. The availability of chemicals associated with the sediments for long-term release to the water column depends on the nature of the bonds between the sediment and the chemical. Studies of the potential for release of pollutants from sediments during dredging and after disposal have determined that chemicals tend to remain in the sediments and are relatively unavailable for release to the water column. Thus, potential effects of dredge-spoil disposal on the plants and animals (see VI.M. Vegetation and Wildlife, p. VI.M.15) that live on or in the sediments, are of greater concern than the long-term effects on concentrations in the water column./25,26,27,28/ The sediments in China Basin Channel may be more polluted with inorganics (such as chromium, copper, lead, and silver) than sediments at other nearby locations in the Bay or at the Alcatraz disposal site and may contain higher levels of DDD and DDT than most other Bay sediments (see p. VI.L.11, and Appendix J. Table XIV.J.7, p. XIV.J.14).

In summary, temporary consequences of dredging could result in conflicts with San Francisco Bay Regional Water Quality Control Board criteria for odor, suspended material, settleable material, sediment, turbidity, dissolved oxygen, bacteria, and toxicity.

Regulation of Dredge Spoils Disposal. The U.S. Environmental Protection Agency (EPA) and Army Corps of Engineers (COE) regulate disposal of dredge spoils in the Bay and ocean. A three-tiered approach has been developed by EPA and COE to make permit decisions for dredge spoil disposal at an aquatic site; if not permitted for aquatic disposal, the spoils would be taken to a land disposal site. Tier 1 evaluation excludes certain materials from testing. Tiers 2 and 3 include sediment and biological tests. Under the proposed regulations, at a minimum, Tier 2 testing would be required for the sediments in China Basin Channel to determine the appropriate disposal location./26/ These detailed analyses have not yet been done because the regulatory agencies prefer that data for permits be recently collected. As it is not expected that permits for dredging would be requested for over one year from publication of the Draft EIR, testing done prior to the Draft EIR would be unacceptably old.

Analysis of sediments from China Basin Channel under proposed Tier 2 standards would require determination of grain size and unit weight, total organic carbon, total and volatile solids, oil and grease, and total and water-soluble sulfides. Testing would also be done for various metals, pesticides, and other contaminants such as PCBs, phenols, and polynuclear aromatic hydrocarbons. A bivalve larvae assay would also be required. The characteristics of sediments in the channel would be compared with the same parameters at the proposed disposal site. If the dredging and disposal sites did not differ markedly, then aquatic disposal could take place. If there were a marked difference in the tested parameters between the dredging and disposal sites, Tier 3 testing, including bioassay and bioaccumulation testing, would be required. The Tier 3 testing program would be tailored to the specific disposal program and governed by the results of the analysis completed in Tier 2./26/ Based on preliminary assessments by KCA Engineers and CH_2M Hill, it is likely that wet dredge spoils from the channel would be contaminated with heavy metals and organics and would require special handling and disposal./29,30/ Dredged material may require dewatering prior to removal from the Project Area to minimize the volume and reduce the possibility of leakage during transport.

The Bay Conservation and Development Commission Bay Plan states the policy that:

> To prevent sedimentation resulting from dredging projects, mud from future dredging should be disposed of in one of the following ways: (a) placement on dry land, (b) placement as fill in approved fill projects, (c) barging or piping to suitable disposal sites in the ocean, or (d) if no other alternative is feasible, dumping in designated parts of the Bay where the maximum possible amount will be carried out the Golden Gate on the ebb tides; areas should be designated for this purpose upon approval by both the Commission and the Army Corps of Engineers. This policy is intended to apply as soon as possible to all dredging in the Bay, whether to create new channels or to maintain existing ones . . . ./31/

In recent years, about 5,000,000 cubic yards of dredge spoils have been disposed of at the Alcatraz aquatic disposal site annually, with about 1,300,000 cubic yards attributable to COE maintenance projects, 1,800,000 cubic yards to Navy maintenance projects, and the remainder to a variety of other activities subject to permit by the COE. The COE is currently studying all in-Bay dredge disposal options, including continued, if modified, use of the Alcatraz site. The dredge spoils generated at Mission Bay would represent less than 1% of the amount disposed annually at Alcatraz. There are problems at Alcatraz with sediment mounding and concerns regarding contamination effects which may limit its use as a disposal site in the future./31/

The disposal of dredged material to the ocean is regulated by the Marine Protection Research and Sanctuaries Act of 1972 (Ocean Dumping Act). The standards applied to analyze proposed spoils for ocean disposal are stricter than COE Section 404 standards./32/ Any material which did not qualify for open water disposal in the Bay would be unlikely to be suitable for ocean disposal.

If the sediments were disposed of in the Bay off Alcatraz Island (the only active disposal site in the Bay) or in a site to be designated in the ocean, the temporary impacts discussed above in relation to increased turbidity and decreased dissolved oxygen levels would result both in the channel and subsequently at the disposal site. In addition, short-term release of possibly toxic chemicals from the sediments could occur at both sites. If disposal were at an upland site, impacts on water quality would be expected only in the channel during dredging as discussed earlier; the disposal site would be subject to Waste Discharge Requirements of the Regional Water Quality Control Board (RWQCB) with jurisdiction over the disposal area.

Before dredging were permitted, public hearings would be required by the COE. Similarly, if BCDC or RWQCB permits would be required for any phase of the dredging / disposal process, there would be public hearings before those bodies issued permits. Sediments from both the dredge site and the proposed disposal site would be tested and the results of the analyses compared. Disposal would not be allowed if the dredge spoils would have significant impacts at the disposal site.

Public Use of China Basin Channel. Alternative A would include residential units, offices, and commercial space and about 14 acres of open space along the south side of the channel. Over 30,000 people would be in the Project Area on a work day. With this increase in local population in the vicinity of the channel, public uses such as fishing would likely increase in the channel. The value of the channel as an aesthetic amenity, however, may depend on whether improvements in water quality occur. Swimming and other water contact uses could also occur even if not intended as part of the development plan, and even if prohibited by the City for public health reasons and water quality regulations. Increased use of the channel would expose additional people to potential hazards, such as viral infections like hepatitis, associated with water contact. The possibility of health effects would be greatest immediately following an overflow when combined sewage and stormwater were discharged to the channel. Since overflows typically occur during the colder wet weather months, it is less likely that water contact recreation would occur in the channel at those times.

Initial Phase of Development. Dredging impacts described above would occur during the initial phase of development. About four acres of open space would be constructed along the south side of the channel. As this would be the only developed open space in the vicinity of the 500 dwelling units and other proposed uses, it would likely be well used. Public uses of the channel would increase over existing levels.

Alternative B

Hydrologic Characteristics. Alternative B includes the development of a wetland along the south central edge of China Basin Channel, but no other changes to its overall hydraulics. The edge of China Basin Channel would be modified under Alternative B; changes would be similar to those proposed under Alternative A, except in the wetland area. The outfall area would remain as a soft, natural edge with gabions. The edge treatment along the rest of the channel would consist of decking and gabions. Edge treatment for the pump station and along a small portion of the south side of the channel would be completed during the initial phase of development. The gabions could improve the stability of the banks and prevent bank erosion in the channel, depending on the detailed plans for the edge treatment.

Development of the wetland would change existing flow patterns in China Basin Channel by adding a waterway that could affect flushing characteristics and sedimentation patterns in the channel. The effects of such changes on the hydrology of the channel are unknown at this time because no development plan exists and sufficient information is not available on the hydraulics of the channel. Flushing at the end of the channel might be reduced because tidal action could be dissipated in the wetland channel. As part of wetland design studies, detailed study of the system would be required to determine if a reduction in flushing would occur and, if so, the magnitude of the effect. Sedimentation in the channel, which is occurring at the rate of three to six inches a year, could decrease the amount of tidal flushing. Maintenance dredging is not proposed under Alternative B.

If dredging does not occur, navigational problems could be encountered by boats attempting to use the channel at low tide and flushing of the channel could be reduced.

Water Quality Effects of Wet-Dredging. No wet-dredging of the channel is proposed under Alternative B. Some minor dredging may, however, be needed to complete the edge treatment. For a discussion of wet-dredging, see Alternative A, above.

Public Use of China Basin Channel. At full build-out, the channel would be an integral part of Mission Bay development. The wetland areas and open space would attract users from the residents who would live in Mission Bay, commercial, office and retail workers, and visitors. The use would likely be greatest in the open space area on the south side of the channel. Impacts of increased human exposure would be similar to those discussed under Alternative A.

Initial Phase of Development. Alternative B would have no hydrologic impacts to China Basin during the initial phase of development, other than those which would occur if the edge treatment were constructed.

Alternative N

No change to the hydrologic characteristics of the channel would occur except that due to natural sedimentation in the channel. Dredging is not proposed under Alternative N. If dredging does not occur, the sedimentation of three to six inches per year in the channel could cause navigational problems for boats attempting to use the channel at low tide. The channel would have "natural" soft edges except for the areas where riprap is in place now. The slopes probably would be less stable than those of Alternatives A and B because they would be unsupported as now. More bank erosion could be expected than under the other Alternatives because the soft muds would be exposed to surface runoff.

Under Alternative N, little change in land use near the channel is expected. A narrow open space area would exist south of the channel. Less increase in use of the channel area would be expected than under Alternatives A or B because there would be no new resident population. However, it would likely continue to be used by residents in existing houseboats and by employees in the vicinity.

The population at risk from exposure to polluted channel water would include the houseboat residents. Employees of businesses in the vicinity also may be exposed inadvertently to polluted channel water; Alternative N includes no provisions for water contact or water-oriented recreation.

DEVELOPMENT OF WETLANDS

Alternative A

No wetlands are proposed for Alternative A.

Alternative B

Hydrologic Characteristics

Three wetland areas would be developed under Alternative B by build-out. The mid-channel wetland area (described above) would be located south of the channel, west of Third Street. The China Basin wetland would be along the south side of the channel, east of Third Street. The bayfront wetland would be near the southeastern edge of the Project Area south of Pier 54. The wetlands would include waterways to allow tidal flushing. No hydraulic analyses have been done for any of the proposed wetlands. Studies completed for the China Basin wetland recommend that the waterway bottom have a minimum elevation of -16.8 feet SFD to allow adequate tidal drainage at low tide. The hydraulic analysis also recommends a minimum bottom width of 10 feet./33/ The waterways would be dry dredged; that is, they would not be opened to tidal action until excavations have been completed. Because of the high water table, dewatering probably would be required during excavation.

Creation of wetlands would increase the water surface area of the Bay and therefore would increase its oxygen-absorbing ability. This supports policies of BCDC./34/

Water Quality

Construction of the wetlands would require excavation along the banks of the channel or the Bay. That construction activity would increase the amount of material that could be transported into the channel or Bay, which could increase suspended solids concentration and turbidity. That would be a short-term effect during the construction period.

Sediments on the banks of the wetlands could be contaminated from the Bay, the channel or, possibly, from groundwater contaminants. If leaching of contaminants occurs, water quality in the wetlands, channel, or Bay would be degraded. Potential impacts associated with removal of contaminated sediments from the channel have been discussed under Alternative A, on p. VI.L.24 and following.

Wetlands can tolerate a range of water quality conditions. In general, the most important variables for successful wetland development are sufficient inundation and proper substrate (underlying soil). Wetlands have been used for outfall receiving areas at some wastewater treatment systems because they are capable of removing significant amount of certain pollutants from water, including suspended sediments and nutrients. Wetlands can physically trap pollutants, and biological uptake of pollutants in plants and animals also removes them from waters. General indications from laboratory and field studies suggest that stress in wetland systems occurs at "excessive pollutant concentrations", but data are not available that suggest specific limiting concentrations of pollutants for wetland development./35,36,37/

Poor water quality in the proposed wetlands could have several sources, including Bay water quality, the outfalls, channel sediments, and groundwater. It is not known precisely which pollutants exist in those sources. A viable wetland could improve some aspects of the water quality by trapping sediments, reducing sediment loads and thereby improving water clarity. The effects on the channel water quality probably would not be visibly noticeable. The water quality in the wetland waterway would depend as well on flushing characteristics. Poor circulation could result in degraded water quality conditions, such as lowered dissolved oxygen concentrations and increased algal growth and thus lower habitat value in the wetlands. Over time, sedimentation could reduce the depth of the waterway, impeding circulation and increasing water temperatures. Maintenance wet-dredging of the waterway probably would be required to maintain appropriate depths and to maintain the appropriate distribution and composition of wetland vegetation./35/

Sedimentation patterns play an important role in the evolution of a wetland. Sediment is transported to the wetland with incoming high tides and deposited during slack water. On the outgoing tide, part of the sediment would be resuspended. In the long-term, sedimentation and encroachment of vegetation would cause the wetland to evolve from mud flats entirely to salt marsh, unless action were taken to retain the mud-flat environment.

The quality of urban runoff is discussed above (see p. VI.L.14). If urban runoff flows into the wetland, urban pollutants, such as heavy metals, nutrients, and organic chemicals, would degrade the water quality of the wetland and could harm its vegetation and wildlife. Under most conditions, runoff from the Project Area would be collected in the sewer system and would not be directed to the wetland.

Leaking tanks of petroleum products or other potentially toxic chemicals or contaminated soils may exist in the area. If contaminated groundwater seeps into the wetland, it would degrade its water quality and possibly harm vegetation and wildlife.

The location of wetlands adjacent to an urban area could result in accumulation of trash, floating debris and algae along the edges of the wetlands. Many people may perceive of the "wild" character of the wetland as making it suitable for unauthorized dumping. Periodic removal of such material would be required./24/ Moreover, illegal dumping of hazardous materials ("midnight dumping") might also occur, possibly resulting in devastating effects on vegetation and wildlife.

Under best-case assumptions, water quality would not cause a problem for wetland development. This would be true if channel and groundwater quality and tidal flushing are sufficient and if excessively polluted urban runoff does not enter the wetland.

Under worst-case assumptions, some or all of the water quality factors would be poor enough to significantly adversely affect wetland development. If toxic substances occur in the wetland, the vegetation could fail to take hold or, following initial success at establishment, subsequently could be damaged. This is discussed in VI.M. Vegetation and Wildlife, p. VI.M.19. If that occurs, the wetland would not function to improve surface water quality since both vegetation and hydrological interactions are closely interdependent. If groundwater and sediments in the vicinity of the marsh were to cause such degradation, remedial action to improve groundwater quality could also allow development of the wetland. If that is not technically or economically feasible, the wetland probably would not flourish or could become a source of contamination for wildlife.

China Basin Wetland

Because of its location at the Bay, circulation is not expected to be a problem within the China Basin wetland./24/ China Basin wetland could affect the existing local flow patterns near the mouth of the channel and affect sedimentation or erosion patterns in the channel; the effect would depend on the interaction between the hydraulics of the Bay, China Basin Channel and the new wetland channel. Wave action from the Bay could erode the outer banks of either wetland area.

Mid-Channel Wetland

Because the mid-channel wetland would be inland from the Bay and connected to the channel, there are concerns about water circulation and water quality in it. Tidal flushing is expected to be poorer at the mid-channel location than at the China Basin wetland, so a different channel configuration from that identified for the China Basin wetland may be necessary. To maintain adequate tidal flushing a deeper or wider channel may be required.

The water quality of the mid-channel wetland would be affected by that of the channel. Of the three wetland areas proposed, the mid-channel area would be subject to the worst water quality conditions because tidal flushing is weaker there than at the other two sites and because this wetland is closest to the combined stormwater/sewer outfalls.

Development of the mid-channel wetland would require the removal and reconstruction of the large storage sewer beneath Channel Street and portions of the sewer along Fourth Street (see VI.D. Community Services and Infrastructure, Sewers and Waste Treatment, p. VI.D.106)./38/

Bayfront Wetland

All tidal water entering the bayfront wetland would pass under China Basin Street. If that passageway were too constricted, then adequate circulation and flushing would not occur in spite of its generally favorable location immediately adjacent to the Bay.

The construction of the bayfront wetland would not be expected to have any overall impacts on tidal flow and water exchange in the channel or Bay. The construction of the wetland would not affect Bay circulation, except for minor, local changes of flow into the new waterway. The estimated sedimentation rate in the China Basin wetland is projected to be similar to that in China Basin Channel near Fourth Street; that is, about one-half foot per year in deeper water, e.g., at -22 feet SFD. As the water becomes shallower, the sedimentation rate decreases and is about one-quarter foot per year at -11 feet SFD./33/

Alternative N

No wetlands would be developed under Alternative N.

MITIGATION

Measure	Alternative	Description
L.1	A,B,N	During construction, if piles of dirt are to remain in the Project Area, minimize degradation of water and air quality due to erosion by the following measures where appropriate: - Install filter fences, haybales, or both to slow water and remove sediments; - Plant surface with grasses; or - Cover soil with stabilizing coatings or plastic sheeting. Planting annual seedlings could reduce soil losses by as much as 90%. Jute or excelsior mats could reduce them by 70% to 80%./39/
L.2	A,B	For all wet-dredging: - Dredge during times when tide and runoff are expected to cause high turbidity independently of dredging; - Dredge during times when tide and runoff would not carry excessive suspended material from the channel into the Bay; - Avoid dredging when herring are expected to spawn.
L.3	A,B	For wet-dredging with suction equipment, employ best practices for reducing turbidity, such as those discussed by Huston and Huston./40/ These practices include: - Turning the cutter as slowly as possible within the confines of economical production. Usually slower speeds are more economical and create less turbidity. - Avoiding burying the cutter unless all the material can be picked up by the suction.

Measure	Alternative	Description
		– Using a rotating suction assembly whenever possible. This permits using smaller cutters that create less material disturbance. – Using dredges of proper size. Hulls that are too wide, long or deep create turbidity by hitting the sides and bottom of the cut. – Keeping anchor wires free of soft bottoms and banks to prevent disturbance and caving of material. – Keeping pipeline connections tight, particularly on floating lines. – Using proper methods of swing and set to pick up all material.
L.4	A,B	For all wet-dredging with buckets: – Use "tight-bucket" clamshell dredging equipment to minimize loss of sediments into the water column and drop of sediments into the water. – Install siltscreens to minimize sediment movement away from the dredge site.
L.5	A,B,N	To reduce peak runoff flows and overflows, employ devices such as rooftop or surface detention structures where feasible to hold runoff so that it could be released more slowly over a longer period of time. Surface detention structures, for example, could be located under gratings in parking lots or could be decorative, gravel-filled depressions which receive water from impervious areas such as rooftops or sidewalks. Their areas and volumes would be highly variable. Open space areas could be designed to contain landscaped depressions that will temporarily receive stormwater runoff: these could be drained or pumped out following the passage of the peak flow of runoff.

Measure	Alternative	Description
		Rooftop detention structures would require flat roofs and sufficient reinforcement of the structure to support the added weight of the water, especially if an earthquake were to occur while the roofs were loaded; they could be visually intrusive. Additional energy would be used to pump water from cisterns.
L.6	A,B,N	To reduce sediments in the sewer system and at the treatment plants, install and maintain sediment and grease traps in local stormwater intakes during the construction period and clean wheels and cover loads of trucks carrying excavated spoils before they leave construction sites.
L.7	A,B,N	Employ best management practices to reduce the accumulation of pollutants on the street surfaces. Such practices include street sweeping, pet and rodent control, and minimizing the use of pesticides and herbicides for landscaping.
L.8	B	Study hydrology and water quality of China Basin Channel or the Bay at each wetland site to determine design constraints or advantages of each site, including: – Local tidal flushing characteristics because inadequate flushing could preclude development of a wetland and would need to be considered for the appropriate waterway configuration. – Sedimentation rates and type of sediment that would be deposited to determine if appropriate substrate for wetland development would be available. – Water quality characteristics, particularly toxics, in the channel and the groundwater to determine if cleanup would be required prior to wetland development.

Measure	Alternative	Description
L.9	B	If surface water or groundwater contamination is determined to be at levels that would harm wetland vegetation or wildlife, perform cleanup operations prior to development of the wetland. As necessary, remove contaminated soil, repair leaking underground storage tanks, clean up or pump contaminated groundwater, or design actions to improve water quality in the channel.
L.10	B	Design wetlands to ensure proper flushing and drainage throughout the tidal cycle. That would limit the potential for certain water quality problems, improve the viability of the wetland, and reduce the potential for mosquito infestation. If tidal flushing is inadequate, pumping could be used to maintain proper flushing; pumping would use energy.
L.11	B	Construct the wetlands and design the local stormwaters collection systems in surrounding parks and open spaces to ensure that urban runoff (possibly containing soil, organic materials, pesticides, herbicides and other pollutants) would drain into the city sewer system and not flow into the wetland, except under extraordinary conditions such as flooding. That measure would greatly reduce the potential for urban runoff typically containing soil, heavy metals, organic material, oils, phenols, coliforms to affect the water quality of the wetland. Sewer systems designed to city standards would be built in existing and new streets and would collect urban runoff as well as sewage from surrounding areas./41/
L.12	A,B,N	Thoroughly investigate existing and potential groundwater contamination on the site prior to development, including

Measure	Alternative	Description
		the relationship between the groundwater flow regime and the channel and Bay system. Take remedial action for any existing pollution problems, if appropriate.
L.13	A,B,N	Use corrosion-resistant pipes and underground storage tanks to reduce corrosion and the potential for underground pipe and storage tanks leakage into the groundwater.
L.14	A,B,N	To protect the public from health hazards posed by exposure to water in China Basin Channel, install railings and barriers to restrict access to the channel. Place multi-lingual explanation and warning signs along the channel explaining potential health consequences of water contact or eating fish caught in the channel.

NOTES

SETTING

/1/ Olmsted, Roger, Nancy Olmsted, D. Fredrickson, and V. Bente, "San Francisco Bayside: Historical Cultural Resource Survey," a report submitted to the San Francisco Clean Water Program, 1982.

/2/ California Regional Water Quality Control Board, San Francisco Bay Region, Water Quality Control Plan, San Francisco Bay Basin (2), 1982, and Proposed Amendments, 1987.

/3/ California Regional Water Quality Control Board, San Francisco Bay Region, Water Quality Control Plan, p. 4-12.

/4/ California Regional Water Quality Control Board, San Francisco Bay Region, Water Quality Control Plan, p. 4-25.

/5/ The five-year storm is the largest storm likely to occur, on the average of once in five years.

/6/ Dames and Moore, Preliminary Report, Geotechnical Consultation, Mission Bay Development, San Francisco, April 15, 1982.

/7/ Dames & Moore, Geotechnical Consultation, Mission Bay Project, December 1, 1982.

/8/ Information on known underground storage tanks (USTs) in the Project Area is based on information provided to ESA by Santa Fe Southern Pacific Realty Company, the San Francisco Public Health Department, and the Regional Water Quality Control Board. The San Francisco Fire Department, the Department of Health Services, and the US EPA also were contacted by ESA.

/9/ Williams, P.B., J. Haltiner and C.C. White, Jr., Preliminary Analysis of a Circulation Design for Mission Bay Project, Philip Williams and Associates, San Francisco, CA, 1986.

/10/ Mean lower low water (MLLW) is the average height of the lower of the two low tides each day. Similarly, mean higher high water (MHHW) is the average of the two higher daily highs.

/11/ City and County of San Francisco, "Bayside Overflows," prepared by CH_2M Hill Engineers, San Francisco, California, 1979.

/12/ San Francisco Clean Water Program, Annual Report, North Shore Receiving Water Monitoring, July 1985-June 1986 and July 1986-June 1987.

/13/ The Soluble Threshold Limit Concentration (STLC) is the concentration of a solubilized and extractable bioaccumulative or persistent toxic substance which is equaled or exceeded in a waste or waste extract renders the waste hazardous (California Code of Regulations, Title 22, Section 66194). STLCs have been established for 19 inorganic and 17 organic substances, (Title 22, Section 66699).

/14/ The Total Threshold Limit Concentration (TTLC) is the concentration of solubilized, extractable, and nonextractable bioaccumulative or persistent toxic substance which, if equaled or exceeded in a waste, renders the waste hazardous" (California Code of Regulations, Title 22, Section 66206). TTLCs have been established by the Department of Health Services for 20 inorganic substances and 18 organic compounds (Title 22, Section 66699). The standards for TTLCs are given in mg/kg wet weight, whereas the analyses of China Basin Channel sediments were reported as mg/kg dry weight. Therefore, without additional knowledge about sediment moisture content, the two are not comparable.

/15/ Arleen Navarret, Water Quality Chemist, San Francisco Clean Water Program, Southeast Water Pollution Control Plant, interview, June 22, 1987. Data for the past few years of sampling in the channel was provided.

/16/ J.M. Dela Cruz, San Francisco Clean Water Program, interview, September 25, 1986. A record of this meeting is available at the Office of Environmental Review, Department of City Planning, 450 McAllister Street, San Francisco.

IMPACT

/17/ Goldman, Steven J., Katherine Jackson, and Taras A. Bursztynsky, Erosion and Sediment Control Handbook, McGraw-Hill, New York, 1986. For a description of the assumptions made to arrive at the soil loss estimates, see Appendix XIV.J. p. XIV.J.14.

/18/ D.M. Champeau, San Francisco Clean Water Program, letter, August 7, 1987. A copy of this letter is available at the Office of Environmental Review, Department of City Planning, 450 McAllister Street, San Francisco.

/19/ David Jones, San Francisco Clean Water Program, telephone conversation, April 21, 1988.

/20/ If sea level were to rise, flooding would occur more frequently. An intermediate rate of sea-level rise of four feet during the next century (the range presented by the EPA is 2 to 8 feet) would place the 100-year tidal event at +2.0 feet SFD by the year 2090. Any parts of the Project Area which had subsided to that elevation would be subject to flooding during tides as high or higher than the 100-year event. Williams, P.B., An Overview of the Impact of Accelerated Sea Level Rise on San Francisco Bay, December 20, 1985.

/21/ San Francisco Clean Water Program, Wet Weather Operation Summary Table, 1985-1986.

/22/ San Francisco Clean Water Program, Bayside Wet Weather Annual Summary, North Shore and Channel Street Systems, 1986-1987.

/23/ T-wall: A T-wall is a concrete retaining wall, constructed in the shape of an inverted "T," which would be used to provide support for hard-edged, straight sides along China Basin Channel. The base of the "T" would be longer than the vertical. The part of the base pointing toward the channel would serve as a hard channel bottom adjacent to the channel edge. The other branch of the base would be buried landward of the channel. Dredging along the T-wall would be done using a drag-line after the T-wall had been constructed.

Gabion:	A gabion consists of broken rock held in place by firmly anchored wire or cable netting. It would be used to prevent slumping and erosion of exposed mud.
Decking:	Decking would consist of wooden walkways along the channel. The decking would be supported on concrete footings adjacent to the channel and on piers sunk near the edge of the channel.

/24/ R.W. Barton, President, KCA Engineers, telephone conversations, July 16 and July 20, 1987. Records of these conversations are available at the Office of Environmental Review, Department of City Planning, 450 McAllister Street, San Francisco.

/25/ Brannon, J.M., Evaluation of Dredge Material Pollution Potential, Technical Report, DS-78-6, U.S. Army Engineers Waterways Experiment Station, Vicksburg, MS, 1978.

/26/ San Francisco Bay Regional Water Quality Control Board, U.S. Army Corps of Engineers, and U.S. Environmental Protection Agency, Joint Public Notice No. 87-1, Interim Testing Procedure for Evaluating Dredged Material Suitability for Open-Water Disposal in San Francisco Bay, June 29, 1987.

/27/ U.S. Army Corps of Engineers, U.S. Army Engineer District, San Francisco, Dredge Disposal Study, San Francisco Bay and Estuary, Appendix F, Crystalline Matrix Study, 1975.

/28/ U.S. Congress, Office of Technology Assessment, Wastes in Marine Environments, OTA-0-334, Washington D.C., U.S. Government Printing Office, pp. 237-253, 1987.

/29/ San Francisco Department of City Planning, September 1986, "Canal Systems," Special Study for Mission Bay, Section V, Mission Bay Canal Alternatives, KCA Engineers, August 1982.

/30/ CH_2M Hill, study prepared for Jefferson Associates, May 6, 1983.

/31/ Final EIS: Homeporting: Battleship Battlegroup Cruiser Destroyer Group, prepared by Environmental Science Associates, Inc. for U.S. Department of the Navy, Western Division Facilities, Engineering Command, San Bruno, California, July 1987.

/32/ San Francisco Bay Conservation and Development Commission, Staff Report on Water Quality in San Francisco Bay, January 1987.

/33/ San Francisco Department of City Planning, September 1986, "Wetlands/Playfields," Special Study for Mission Bay, San Francisco, Appendix B, Hydrologic Analysis prepared by Phillip Williams and Associates.

/34/ San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan, adopted January 1969, amended July 1979.

/35/ Krone, Ray, "Engineering Wetlands: Circulation, Sedimentation and Water Quality" in Michael Josselyn, ed., Wetlands Restoration in California, December 1982, Tiburon Center for Environmental Studies, California Coastal Commission and Coastal Heritage Foundation, Report No. T-CSGCP-007.

/36/ Chan, Emy, et al., "The Use of Wetlands for Water Pollution Control", November 1981, Association of Bay Area Governments, Berkeley CA, in association with Ramlit Associates.

/37/ Josselyn, M., 1983, The Ecology of the Bay Tidal Marshes: A Community Profile. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-83/23.

/38/ San Francisco Department of City Planning, Sewage Overflow Options, Mission Bay, San Francisco, September 1986.

MITIGATION

/39/ Goldman, Steven J., Katherine Jackson, and Taras A. Bursztynsky, Erosion and Sediment Control Handbook. McGraw-Hill, New York, 1986.

/40/ Huston, John W., and William C. Huston, Techniques for Reducing Turbidity Associated With Present Dredging Procedures and Operations, prepared for Environmental Effects Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Dredged Material Research Program, Contract Report D-76-4, May 1976.

/41/ Roesner, Larry A., "Quality of Urban Runoff" in Urban Stormwater Hydrology, David F. Kiber, editor, American Geophysical Union, Water Resources Monograph 7, 1982.

M. VEGETATION AND WILDLIFE

SETTING

The majority of the Mission Bay Project Area was formerly a major embayment of San Francisco Bay. Early survey maps for the mid-1800s show Mission Bay extending inland to the west of Seventh Street, with the marsh margin along Mission Creek continuing upstream from the exposed mudflats to the vicinity of the present Mission Street./1/ Extensive filling took place in the late 1800s, which reduced the marshland and bay habitat to China Basin Channel as it currently exists (see VI.J. Cultural Resources, p. VI.J.5 - VI.J.6). The remaining habitat of the channel and environs is described in the following sections./2/

Vegetation

The former marsh and bayland plant community of the Mission Bay Project Area has been almost completely altered by filling and industrial development. Existing terrestrial vegetation is restricted to weeds in vacant lands around the Mission Creek channel and other areas within the Project Area. No natural (i.e., native) upland vegetation and limited natural estuarine vegetation exist. Ornamental plantings occur at three locations along the channel: (1) around the Channel Street Pump Station at the west end of the channel, (2) at the houseboat community on the south side of the channel, and (3) along the boardwalk of the China Basin Building between Third and Fourth Streets.

No federal- or state-listed rare or endangered plant species are known to exist within the proposed project site. Three rare plant locations are reported for the Potrero Hill area, approximately 0.5 miles south of the project boundary/3,4/: Orthocarpus floribundus, the San Francisco owl's clover; Fritillaria liliacea, the fragrant fritillary; and Sanicula maritima, the adobe sanicle. These species are listed as rare and endangered by the California Native Plant Society./5/ All populations of these species on the project site have been eliminated/3,4/, and no suitable habitat for these species is found on or near the project site.

Surveys indicate that marsh and marine vegetation, which provide habitat for wildlife, are found along those sections of the channel's banks that have not been covered by pilings, piers, rubble, bridge supports or other structures./5/ Common pickleweed (Salicornia virginica) forms colonies along the banks of the channel in those areas at the mean high tide level in an intermittent, narrow band, varying in width from 0.5 to 1.5 meters. This species, which is the dominant plant of San Francisco Bay marshes, is adapted to tidal inundations but intolerant of continuous submergence. Green alga (Enteromorpha sp.) occurs seasonally in the outer and middle portions of the channel. At the bay entrance to the channel, a marine plant community occurs on the rocks and pilings and is indicative of ambient bay conditions. At the head of the channel near the pump station and overflow structure, the banks of the channel have only introduced weeds and grasses and marine vegetation is lacking. The bottom sediments have a layer of Sphaerotilus sp., a fungus commonly associated with sewage discharges. The filaments of this fungus are the main component of a microbial complex commonly called "sewage fungus," which is the slime-like substance found on rocks in waterways receiving sewage pollution./6/ The contamination levels in sediments at the head of the channel are likely a significant factor for the lack of marine vegetation there, although no studies exist that have determined the reason for the lack.

Wildlife

The open waters of San Francisco Bay provide habitat for large numbers of birds that migrate along the Pacific Flyway. The birds use offshore bay waters for resting, feeding and wintering areas. Some birds use inshore tidal creeks, channels and sheltered areas around piers. The urban character of the project site and lack of terrestrial vegetation for food and cover limit the Project Area's habitat value for wildlife.

China Basin Channel is used by water birds, such as ducks, gulls, terns, shorebirds, pelicans, loons, grebes, cormorants, herons, and egrets. Bird censuses were conducted on February 18 and 26 and on March 14, 1986, for the project site and adjacent areas./7/ Appendix K. Vegetation and Wildlife, Table XIV.K.1, p. XIV.K.1, lists common bird species that were sighted or would likely occur in the study area. Snowy and great egrets and great blue herons are among those common species. Many of the species listed are migratory and use the area for resting periods of short duration. The number of year-long resident species is not known. Birds detected in the censuses were primarily water-related species, which are present in San Francisco Bay in fall and winter, but leave in the spring to breed elsewhere. The lack of suitable vegetation for cover and absence of trees render the project site unlikely for any breeding use by these species, except possibly the Forster's tern.

While the number of species that could use the area is relatively large, the actual number of individuals is low. The low use is related to the reduced productivity of the aquatic community, human presence in the area and lack of terrestrial vegetative cover. Gulls, starlings, pigeons and doves predominated, in the bird censuses, representing more than 90% of all individuals observed.

Terrestrial birds in the area also include various species of common songbirds such as sparrows, starlings and blackbirds that are typical of urban areas. An American Kestrel (Falco sparverius), formerly known as sparrow hawk, was observed in 1983 in the vicinity of the China Basin Building. This species eats rodents and large insects, and is known to nest in niches of buildings.

The California brown pelican (Pelecanus occidentalis) is the only rare or endangered bird species that occurs along the Mission Bay shoreline. The brown pelican is officially listed as Endangered by the U.S. Fish and Wildlife Service and by the State of California./8,9/ Pelicans are regular summer migrants to San Francisco Bay, and are commonly seen diving for fish and perching on bayside pilings. After a severe decline in the early 1970s, caused by reproductive failures related to pesticides, their numbers are now steadily increasing. The number of pelicans in the vicinity of Mission Creek is low. Their low numbers can be attributed to an inadequate food supply, principally northern anchovy and topsmelt, in the area.

The lack of suitable cover and food resources limits also the terrestrial mammals to those species commonly occurring around industrialized urban areas, including the black or Norway rat, house mouse, meadow mouse, and gopher in addition to domestic dogs and cats. No rare or endangered species are known to exist or likely to inhabit the Project Area or vicinity.

While no large terrestrial mammals are present, harbor seals (Phoca vitulina richardii) are regular visitors to the outer reaches of China Basin Channel. There are several populations of harbor seals in San Francisco Bay; the animals that have been observed in the waters in the vicinity of the Project Area could belong to any one of these wide-ranging populations. The industrial activity and quality of the bank slope substrate likely would preclude the animals from entering the channel; however they may possibly haul out on the rocks at the entrance to the channel.

Aquatic Habitat

The present China Basin Channel is not a naturally occurring tidal creek but the remains of the former Mission Bay. In an assessment of the benthic (bottom dwelling) community in China Basin Channel done in 1979 by CH_2M Hill Engineers, the community structure exhibited low species diversity, productivity and habitat value in comparison to the benthos found in the open Bay by the mouth of the channel. The combined sewer overflows, which enter near the head of China Basin Channel, contribute to the degraded nature of this waterway, as does the dead-end slough configuration of the channel. However, in the absence of an extensive monitoring and sampling program, an objective, quantitative definition of the water quality problem and its relationship to aquatic habitat in the channel does not exist.

Sewage overflow discharges, generally occurring in the winter and spring, have reduced the value of aquatic habitat in China Basin Channel, particularly in the reach upstream of the Fourth Street Bridge. Because of tidal exchange in the channel, most water quality impacts of overflows have been shown to be short-lived beyond the storm event creating the overflow/10,11/; however, sediment and biological impacts are likely to be more persistent (see VI.L. Hydrology and Water Quality, p. VI.L.10). Those discharges contribute settleable particulate matter containing heavy metals, inorganic and organic matter which, through oxidation, place a high oxygen demand on the sediments and overlying waters, contributing to anaerobic conditions./12/

Past studies of the benthic community and fish population in upper China Basin Channel show reduced numbers and species of typical estuarine organisms, when compared to the area bayward of the Third Street Bridge./9/ Bottom grab samples taken during these surveys showed the upper China Basin Channel nearly void of benthic organisms (biomass varying from nearly zero to 4.8 grams per 0.05 square meter). Sediment chemistry data also show that sediments at the head of the channel are unsuitable for bottom-dwelling organisms. The predominance of mollusks and polychaetes, in terms of biomass, suggests that the benthic community is stressed. A list of the most abundant benthic invertebrate species collected during the 1979 survey of the channel is provided in Table XIV.K.4, p. XIV.K.2 of Appendix K.

Foraging area and habitat, which could contain food sources such as marine plants, burrowing clams, mussels, annelids (tube worms), and crustaceans (crabs, shrimp, isopods, etc.), are provided by piles, walls and dock structures. However,the quality of upper China Basin Channel sediments (above the Fourth Street Bridge) and associated biological community provide virtually no foraging area for bottom-feeding fish species. Between the Fourth and Third Street Bridges, sediments still have high organics and metal concentrations and oxygen deficient conditions; therefore, that reach provides only marginal habitat and foraging for fish./10/ The fish community bayward of the Third Street Bridge is likely to contain a more representative collection of San Francisco Bay species on a permanent or transitory basis. Those individuals are likely to follow the flood tide into the China Basin Channel to forage, then migrate outward to the Bay during the ebb tide. Thus, the outer portion of China Basin Channel provides an important foraging area for many common Bay fish species.

During the combined sewer overflow studies, trawls performed in the inner channel (upstream of the Fourth Street Bridge) at high tide yielded a few individuals of the following species: Pacific herring (Clupea harengus pallasii), shiner surfperch (Cymatogaster aggregata), Northern anchovy (Engraulis mordax), and one speckled sanddab (Citharichthys stigmaeus). Trawl catches in the Bay at the entrance to China Basin Channel revealed a greater number of species as listed in Appendix K. Table XIV.K.3, p. XIV.K.5. In fact, the waters immediately outside other channels yielded the highest numbers of fish caught of six San Francisco bayside areas sampled./10/ However, by comparison to similar trawls conducted at sites outside the channel (i.e., bayward of Islais Creek, Sunnydale and Yosemite Channel), the species number and diversity in the China Basin Channel was very poor.

Table XIV.K.4, p. XIV.K.6 of Appendix K., presents a list of the common sport and commercial fishes expected to appear in the vicinity of the China Basin Channel entrance and possibly within a portion of the channel during the year. Other species also may be recorded on an occasional or migratory basis.

The Pacific herring fishery is one of the last remaining commercial fisheries in San Francisco Bay. The current fishery began in 1973 and specializes in herring roe (eggs) rather than the fish itself./13/ The roe is exported to Japan, where it is considered a delicacy. Consequently, commercial exploitation coincides with spawning of the herring in the Bay from November to March. Peak spawning months are typically December through February.

Because of its commercial importance, Pacific herring populations and spawning success are closely monitored by the California Department of Fish and Game. In recent years, studies have indicated increased herring spawning activity along the San Francisco waterfront, including the shoreline east of the Mission Bay Project Area./14/ Marine vegetation, pier pilings, riprap and other "hard surfaces" provide the preferred substrate for herring spawning./15/ Although the shoreline east of the Project Area is herring spawning habitat, substantial use of the middle and upper reaches of the China Basin Channel by herring has not been observed./16/

No rare or endangered fish species are known to exist or likely to inhabit the waters of China Basin Channel or San Francisco Bay in the vicinity of the Project Area.

IMPACT

TERRESTRIAL AND WETLAND VEGETATION / WILDLIFE

U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, and California Department of Fish and Game do not have policies or plans specifically applicable to Mission Bay. In the San Francisco Bay Plan, BCDC has developed policies concerning fish and wildlife in San Francisco Bay. Those polices encourage the retention and restoration of marshes and mudflats in San Francisco Bay./17/

Alternative A

At build-out, there would be a total of 55.3 acres of open space potentially suitable for wildlife habitat (See Table VI.D.15, p. VI.D.77). Landscaped open space would comprise 43.3 acres, the remaining 12 acres would be open water in China Basin Channel.

The open space would be landscaped parklands. Public access and recreation would be allowed in all open areas. No wetlands or additional open water habitat over present conditions would be created. Specific plans have not been developed, but most of the "natural" shoreline along China Basin Channel would be eliminated by construction of rock and wire gabions, wooden decking and concrete T-wall. Of the three types of edge treatment, wooden decking would provide the most habitat value, as some birds would be able to use mudflat areas beneath the decking for feeding and hiding. A small amount of "natural" soft edge (i.e., earthen, with vegetation) shoreline would remain unaltered around the outfall area at the head of the channel. Thus, most existing shorebird feeding sites would be lost. Hard edge treatment eliminates exposed soft mud which provides feeding areas for shorebirds.

The landscaped parklands would be open space with lawns, shrubs, trees, maintained gardens and playing fields. They would be urban in character rather than natural and untended. A mix of active and passive recreation would occur in the park. Dogs, cats, and human activity would reduce the value of the area for some wildlife species such as ground nesting birds. A variety of tree and shrub species would be used in the plantings, offering cover and nest sites for birds. Most plant species would not be native to the area. Depending on the species planted, shrubs and trees may provide a food source for hummingbirds and fruit-eating birds./18/ Emphasis on using berry and other fruit-producing species would enhance the value for wildlife. Some open space areas would be long narrow strips less than 50 feet wide (OS-4, OS-9, OS-10, and OS-11 shown in Figure VI.I.12, p. VI.I.58. Because of human activities in adjacent areas, those corridors would receive limited use by wildlife.

Animals that are not sensitive to human activity and disturbance would be expected to use the open space areas. Areas with high recreational use (such as occurs at the Marina Green) would offer less wildlife use than areas with less intense recreation activity. Land birds expected to use the park-like open space include rock dove, mourning dove, American robin, northern mockingbird, European starling, brown towhee, white-crowned sparrow, Brewers blackbird, house finch and house sparrow./19,20/ These are all common species in urban parks. The open land areas would provide feeding, roosting and breeding habitat for these species. The majority of the birds are expected to be non-native species: Rock dove, European starling and house sparrow. Black rat, roof rat, house mouse, pocket gophers and domestic cats and dogs would comprise the expected mammal species./21/ After the construction period, raccoons may occur in the Project Area if there are nearby populations. California slender salamander and western fence lizard are expected to inhabit the park areas./22/

By the year 2020, the increased acreage of open space habitat is expected to support increased numbers of animals over the year 2000 condition. However, increased human recreation in those park areas, relative to the year 2000, may reduce the use of these areas by some species, such as white-crowned sparrow./19/ The park areas would provide feeding, roosting and breeding sites for birds. Human activity could reduce wildlife use of the park areas, thereby offsetting the benefits of increased habitat area.

Vegetation established in parkland earlier in the development process would be more mature by the year 2020; trees would be larger and shrubs more developed. The vegetation would provide increased cover and food production per acre for wildlife compared to the year 2000; this would increase the value of the site to terrestrial wildlife.

The open water in China Basin Channel would continue to provide feeding and resting habitat for common gulls and waterbirds. Typical species expected to use the channel are Western grebe, Western gull, California gull, mallard, double-crested cormorant, cinnamon teal and lesser scaup./19,20/ Increased human activity in adjacent areas would substantially reduce or eliminate heron and egret use of the shoreline. The relatively small number of displaced bids would forage in other parts of the Bay Area. Human activity and lack of protected sites probably would preclude nesting by waterfowl and shorebirds along the shoreline and elsewhere in the Project Area. As nesting is not known to occur at present, this Alternative would represent a continuation of the existing conditions that inhibit nesting.

Harbor seals would not be expected to use the open water habitat provided by China Basin Channel because of disturbance from boating and other human activity. They may, however, occasionally use waters at or near the mouth of the channel as feeding areas.

Initial Phase of Development.

Under Alternative A, there would be a total of 6.5 acres of open space in the initial phase of development and an additional 12 acres of open water habitat in the channel. About 5.6 acres of that open space would be potentially suitable as wildlife habitat. The shoreline of the channel would be developed and most existing shorebird feeding sites would be lost. Dredging the channel and construction nearby temporarily would disrupt birds in that area.

Alternative B

At build-out, there would be a total of 94.1 acres of open land potentially suitable for wildlife habitat by the year 2020 (see Table VI.D.15, p. VI.D.77). Park-like open space would comprise 45.3 acres and 33.8 acres would be tidal wetlands; the remaining 12 acres would be open water.

A mix of active and passive recreation would occur in the landscaped open land areas. Passive recreation is proposed along the edges of the three wetlands. No increase in open water habitat over present conditions is planned. Most of the existing shoreline along China Basin Channel would be eliminated by the construction of rock and wire gabions and wooden decking. A small amount of "natural" soft edge (i.e., earthen with vegetation) shoreline would remain around the outfall area. By the year 2000, shorebird feeding sites along the mid-channel would be removed and replaced by a larger area of wetlands suitable for shorebird habitat. In addition to shorebirds, herons and egrets are expected to use the wetlands. If properly designed and executed, the larger wetland area and shorebird habitat of the mudflats and salt marsh would provide feeding and resting sites for great blue herons, great egrets, shorebirds, black-crowned night herons, snowy egrets, killdeer, sandpipers, and sanderlings./19,20,23/ No substantial temporary impacts to wildlife from creation of the wetlands are expected, as the site currently receives little use. Impacts from marsh creation are expected to be transitory.

Human use of the wetlands would be limited to nature observation and appreciation from walkways and observation platforms along the perimeter of the wetlands. Pets would not be allowed into the wetlands; however, some uncontrolled entry of dogs and cats may occur. The incursion of occasional dogs and cats would disturb the wildlife. Walkways into the wetlands would increase the ease of access by humans and pets and, therefore, the frequency of such disturbances. For this reason, only perimeter viewing walkways and steep wall construction along the edges are encouraged. Those controls would help limit disturbance to the vegetation and wildlife that are expected to occur in the wetlands.

The landscaped parkland areas would be similar to those described under Alternative A. Those areas would provide habitat for human-tolerant birds and mammals. The same assemblage of species expected under Alternative A is also expected under Alternative B. Wildlife in the smaller area of habitat would be more subject to disturbance from human activity. This would favor human tolerant species such as rock dove, European starling, Brewer's blackbird and house sparrow. In 2000, Alternative B would have 17.1 fewer acres of open land than Alternative A, and thus, would be expected to support fewer animals likely to use this habitat than Alternative A. At build-out there would be almost triple the acreage of open land available in the Project Area in 2000. Thus, the site would be expected to support more individuals than in 2000. Vegetation established by 2000 would be more mature by the year 2020. Larger trees and more developed shrubs would offer increased cover and per acre food production for wildlife. Thus, the maturing vegetation would increase the value of the site for terrestrial wildlife.

The 13.2 acres of tidal wetlands created by 2000 along China Basin Channel west of Fourth Streets (mid-channel site) would contain mudflats, salt marsh and an island. Pacific cordgrass and pickleweed would be the plant species expected to eventually colonize and dominate the salt marsh community./23/ Jaumea, saltgrass, and gumweed are other plants that are normally encountered in a tidal salt marsh. Colonization by these species would be slow, or perhaps not occur at all, because there are no native marshes in the immediate vicinity to supply seeds or plant parts for vegetative propagation.

The mid-channel wetland initially would have limited vegetative cover and therefore would not provide refuges for wetland animals. New planting included in development of the wetland would shorten the time required for vegetation to establish on marsh elevations (1.5 to 3.5 feet NGVD) and preclude most ruderal (weedy) and nuisance plants which would otherwise take over the upper elevations of the site. Ruderal and nuisance plants would provide minimal value to aquatic and terrestrial animals. No cover for small mammals and birdlife would be provided.

As vegetation matures, the island would provide a protected area for waterfowl roosting and nesting. Brewer's blackbirds from the park area may also use the island for feeding and resting. After vegetation is established on the island, mallards and coots would be expected to nest there./19/ A buffer zone of vegetation would be required around the wetlands to shield the area from human activity and disturbance (see Mitigation); this would enhance the area for use by other more sensitive, human-intolerant species, such as Virginia rail./23,24/

After marsh vegetation has matured, wetlands in Mission Bay would provide an opportunity to expand the habitat available for the salt marsh harvest mouse (Reithrodontomys raviventris). The mouse could be (but not necessarily would be) translocated from other Bay wetlands to enhance populations of this endangered species. Because Mission Bay is remote from existing habitats of the salt marsh harvest mouse, natural colonization is considered highly unlikely.

At build-out there would be an increase of 20.6 acres of tidal wetland beyond that for the year 2000. This acreage would be located in two areas along the eastern edge of the site, one between Piers 52 and 64 (Bayfront wetland) and one between the mouth of China Basin Channel and Pier 48. Each area would contain mudflats, salt marsh and a vegetated island. These areas would be used by the same waterfowl and shorebird species described for mid-channel wetlands. This includes large waders such as herons and egrets. The new areas would support additional individuals of these species. Additionally, the new areas would be more protected from human disturbance than would the mid-channel wetland. This would increase their value to waterfowl and shorebirds over equivalent areas subject to human disturbance./23/ Assumed buffer zones of dense vegetation along the wetlands border would enhance the area by reducing intrusion by people and pets./24/ Because of its location near the mouth of China Basin and its size, the proposed wetland near Pier 48 would be superior in habitat value to the proposed wetland between Piers 52 and 64. Also, the shape of area near Pier 48 allows greater flexibility in wetland design and more opportunity for creation of an island and buffer area than either the mid-channel or Bayfront wetland.

The existing sewage / stormwater outfalls may adversely affect shorebirds and waterfowl using the wetlands, particularly during overflow periods. The mid-channel wetland and, to a lesser extent, the China Basin wetland would be most vulnerable to sewage discharges. Effects could include reduced populations of prey species as a result of lowered dissolved oxygen levels in the water, lower plant productivity and increased incidence of disease among wildlife.

Birds could be expected to move between and use all three wetland areas. Small mammals are less mobile and are expected to be more restricted to one wetland area. The lack of connections between the three wetlands would make small mammal movement between the wetlands difficult; large streets would be barriers to movement of some animals.

Wetland habitats in the San Francisco Bay Region continue to be eliminated and altered./23/ Wetlands provide a continuity of habitat between the open waters of the Bay and upland areas. Wetlands increase the wildlife diversity by providing additional habitats, and by providing many of the animals' life history requirements (e.g., feeding, mating, and nesting) in one area. Tidal marshes provide habitat for invertebrates, which form an important link in the ecosystem of the Bay. The invertebrates are consumed by juvenile fish, waterfowl and shorebirds./23/ Creation of wetlands in the Project Area would add to the diversity of habitats and wildlife on-site and protect a diminishing natural wildlife community in the Bay Area. Increased diversity of wildlife species would add to the passive recreation opportunities and enjoyment of local residents. The creation of wetlands within Mission Bay, as proposed in Alternative B, is not required by BCDC fish and wildlife policies and those for marshes and mudflats, but would respond to BCDC policies. The proposed wetlands would serve to enhance the presence of wildlife, provide public benefits and augment the number of marshes existing in the Bay.

Initial Phase of Development

Under Alternative B, there would be a total of 18 acres of open space and open water habitat, including the existing channel and 6.0 acres of landscaped open space in the initial phase of development. About 5.3 acres of the open space would be potentially usable as wildlife habitat. Edge treatment along the channel would include rock and wire gabion and wooden decking. Most of the existing shorebird feeding sites along the channel would be retained in the initial phase of development. Construction of the mid-channel wetland temporarily would disrupt birds in that area.

Alternative N

By the year 2020, there would be a total of 17.2 acres of open land suitable for wildlife habitat (see Table VI.D.15, p. VI.D.77). Park-like open space would comprise 5.2 acres, an increase of 1.8 acres over the open space in the year 2000. Twelve acres would be open water. The park-like open space would be a narrow linear band with limited wildlife value.

The park-like areas would provide habitat for urban, human-tolerant birds and mammals. The same assemblage of species expected to occur in this habitat under Alternative A is expected to occur under Alternative N. Alternative N would have 50 fewer acres of this habitat than would Alternative A. Thus, Alternative N would support fewer animals than Alternative A, but more than existing conditions provide. Shorebirds, herons and egrets would continue to use the "natural" shoreline of the channel for foraging as long as food is available.

The shoreline of China Basin Channel would remain a mix of existing bank conditions (i.e., earthen with vegetation) and concrete rubble that would preserve existing shorebird feeding habitat along the channel. By comparison, Alternative A and B would result in substantial changes to the existing conditions. Thus, Alternative N would not result in displacement of the individual birds and other animals using the banks at present. The open water habitat in Alternative N would be identical to that in Alternative A. Thus, the same species are expected to use the area as those described under Alternative A for the year 2000. Like Alternative A, increased human activity near the channel under this Alternative would substantially reduce or eliminate egret and heron use of the channel. The displaced individuals would forage in other parts of the Bay Area.

Approximately the same numbers of birds are expected to use the water areas under Alternative N as under Alternative A. Although more existing bank conditions would remain along the channel, there would be no adjacent open space. Thus, there would be more disturbance to birds along the channel from human activity under Alternative N than under Alternative A, even though total human activity in the Project Area is less under Alternative N.

AQUATIC LIFE

Alternative A

Under Alternative A, the aquatic environment would be most affected by any temporary changes in local water quality brought about by dredging of the China Basin Channel, and changes in non-point runoff patterns and characteristics. These changes would result in short-term effects on aquatic organisms described below. The greater amount of dredging in the initial phase of development would probably have the most effect on aquatic organisms. Lesser effects would occur in subsequent dredging near the banks up to the year 2000.

Dredging of China Basin Channel and disposal of dredged material at either an ocean or Bay disposal site would cause the suspension of fine particulate matter contained in the bottom sediments into the water column which, in turn, would elevate local turbidity levels. The degree of turbidity would vary substantially with the quantity and duration of the dredging, and would depend also on the type of dredging equipment used, quality of equipment and care of the operator. In all cases, the increased turbidity levels would be short-lived and generally confined to within a few hundred yards of the dredging activity. After initially high turbidity levels, sediments would disperse and background levels would be restored within a short time (hours) of dumping. The particulate materials associated with the turbidity would likely cause short-term disruption of feeding and respiration of resident invertebrates and of fishes unable to avoid or remove themselves from the area./25/ While some fish would die because of dredging, it is not likely that significant fish kills would result.

Under most conditions, the fish assemblage known to exist near the mouth of China Basin Channel most likely would not be affected by dredging. Turbidity plumes resulting from dredging would be dispersed relatively rapidly (probably within a matter of hours) and the particulate concentrations would be diluted to levels that would pose no significant threat to most fishes at the channel mouth or off China Basin in the Bay. However, if the two-month dredging operations were to coincide with the peak spawning season of Pacific herring (December to March), there could be local disruption of that fishery. Herring deposit large masses of eggs on aquatic vegetation and hard substrates such as rip-rap and pilings. Because of the adhesive nature of the surface of these eggs, clay particles, such as those suspended in the water column after dredging, stick to the eggs. Thus, the eggs are susceptible to smothering during high turbidity periods. Hatched fry are susceptible to smothering by fine suspended particulates during periods of high turbidity levels because they can cause gill abrasion, clogged gills, and suffocation. Loss of both eggs (roe) and fry could potentially reduce herring populations and reduce future catches for an indefinite period.

Contaminants associated with (bound to) the suspended sediments also may degrade water quality by reducing dissolved oxygen concentrations in the water column and leaching contaminants from the sediments. The mechanisms by which these affect water quality are discussed in VI.L. Hydrology and Water Quality, p. VI.L.24. Significantly depressed oxygen levels (i.e., below five mg/l) may cause respiratory stress to aquatic life and levels below three mg/l may cause acute mortality./26/ However, oxygen levels are not expected to remain low for long periods for two reasons. First, tidal flushing would be expected to ameliorate depressed oxygen levels by introduction of oxygenated water into the channel. Second, dredging of anoxic (oxygen poor) sediments would proceed for a short period of time. In summary, it is likely that the aquatic life would experience respiratory stress from dredging, but high mortality is not expected to result from depressed oxygen levels.

Some contaminants may be released from the sediments and become biologically available to organisms in the water column. The extent of their availability and impact to the biota depend on ambient water conditions at the time of release and the biological condition of the target organisms. Potential impacts could include direct mortality or non-lethal physiological effects such as damage to reproductive or respiratory organs. In addition to water column impacts, there is the potential for bottom-dwelling organisms to bioaccumulate contaminants from the sediments; that is often of more concern than release of chemicals to the water column following dredge material disposal of contaminated sediments. More definitive analysis of the effects to the aquatic community resulting from any release of contaminants from the sediments would require toxicological testing. Provisions for this type of testing are included in recently proposed changes to the U.S. Army Corps of Engineers testing procedures for Section 404 discharges (Clean Water Act). These tests or other similar ones would be required prior to any dredging permits (see discussion in VI. L. Hydrology and Water Quality, p. VI.L.25.)

The benthic community within China Basin Channel is dominated by mollusks and polychaete worms./27/ As a general rule, the presence of a limited number of taxonomic groups and individuals, and dominance by an individual group are characteristic of stressed or disturbed subtidal soft-bottom environments. The dominance of polychaete worms and mollusks suggests that the channel's benthic infaunal (bottom-dwelling organisms) community is stressed. The rate at which this already stressed benthic community would recover after cessation of dredging would be variable and unpredictable. If it is assumed that the underlying substrate is of the same grain size and physical characteristics as the dredged sediment, then the recolonizing benthic community may be similar to the existing community. As the channel would be dredged approximately once every ten years, the benthic community would be able to reach a relatively mature successional stage before extensive recolonization would have to occur. Dredging in the channel could benefit the benthic community by improving water circulation and quality, enabling greater numbers (both number of species and number of individuals of a given species) of organisms to exist there. Any benefit or detriment to water quality would depend on the final character of the channel dredging.

Sewage overflow at the Division Street outfall would continue to limit the environmental conditions for aquatic biota. As changes in land use occur in the project area, non-point source inputs to the channel, such as urban runoff, would also change. Impacts to aquatic organisms may include bioaccumulation of anthropogenic substances such as tars, oils, fuel, in the form of polycyclic aromatic hydrocarbons (PAHs), deposited on streets by increased vehicular traffic in the Project Area and collected by sewers and included in the sewer system.

Along the channel, the gabions, decking, and T-wall may serve as additional substrate for encrusting organisms such as barnacles, algae, sponges, anemones, etc. These structures also may provide feeding and cover habitat, not readily available at present, for gobies, sculpins, and other small fishes.

The status of the aquatic environment at full build-out would depend on the ambient water quality conditions in the China Basin Channel between the period of initial dredging and conditions in 2020. Assuming that the water quality has not been significantly degraded beyond present conditions, the benthic infauna would have recovered from the initial dredging event (and any subsequent maintenance dredging episodes) and recolonized the area. Intertidal and subtidal invertebrate communities would have established themselves on the physical structures in place along the channel's edge.

Initial Phase of Development

Alternative A includes wet dredging of approximately 45,000 cubic yards of sediment from China Basin Channel in the initial phase of development. No change in channel configuration is proposed. A small amount of additional dredging along the banks probably would occur in conjunction with construction of shoreline gabions and wooden decking up to the year 2000. Those would occur on the south side of the channel in its eastern half between Fifth and Third Streets. The wooden decking would provide more habitat value (e.g., places for hiding and feeding) for aquatic organisms than would gabions.

Alternative B

Under this Alternative, dry dredging (excavation) is proposed to create a potential wetlands along the southern shoreline of the channel (mid-channel site) by the year 2000, and the China Basin and Bayfront wetlands by build-out. However, a small amount of wet dredging would occur when the connection between the created wetlands and the channel is excavated. The majority of the historical wetlands and marshes in the San Francisco Bay region have been destroyed. Wetlands are used extensively as nursery grounds for many commercially and recreationally important fish species, such as topsmelt, northern anchovy, striped bass, and surfperches. Those species are important to the diets of waterfowl and shorebirds. There would be a net benefit to these fisheries if wetlands were established at Mission Bay. If, however, in constructing the wetland, the connection to the channel were made during the peak spawning season of the Pacific herring, potentially significant impacts to this species could occur.

The proximity of the mid-channel site to existing and probable future human activity (with consequent human and domestic pet disturbances and predation) and the narrowness of the site make this location less desirable for wetlands development then the site east of Third Street at China Basin proposed for wetland development in the year 2000. Also, tidal flow may not be adequate to flush the wetland sufficiently, and the water quality in the channel at the mid-channel site may be below that which is necessary for establishment of healthy biological communities.

Due to the limited amount of available information about current soil types, grain size, groundwater flow and quality, water and sediment quality, best- and worst-case scenarios are considered in evaluating the potential impact of wetland creation. Under the best-case scenario, it is assumed that all sediments and soils at the mid-channel wetland site are not contaminated at levels below which a hazard exists for aquatic organisms. The substrate of the dredged channel is assumed to be largely uncontaminated fill. It is also assumed that there has been no groundwater contamination from leaking storage tanks and little or nor contamination of surficial soils. It is further assumed that the water quality of China Basin Channel would not be degraded. It is likely that under this scenario there would be removal of at least some surficial soil and a small amount of channel sediments at the time the wetland lagoons are opened to the adjacent water bodies.

Species diversity and usage would be enhanced where the tidal wetland is designed such that channel configurations create slow velocities of water movement and the banks are gently sloped, thus creating mudflat zones. Habitats would be developed that are favorable for the establishment of food sources such as plants, benthic invertebrates (such as polychaete worms and clams) and fishes (such as topsmelt, three-spine stickleback and juvenile fishes).

Initially, the newly developed tidally inundated area would be devoid of benthic life. Colonization, succession rates and community structure of the benthic infauna cannot be accurately predicted. Factors affecting colonization success include the grain size of newly exposed sediments; physical stability of the substrate; contamination levels of the sediments; food availability; and water circulation and quality. Some fish species which may come into the wetland would follow the tidal cycles in their distribution, i.e., enter at high tide and disperse to other areas at low tide. Juvenile and adult fishes such as three-spine sticklebacks, gobies, and sculpins would remain only in areas close to the wetland that are constantly submerged. Deep channels in the wetland habitat would become vegetated by vascular plants or algae, thereby reducing water velocities and creating diverse habitats for fish breeding, egg, and larval development./28/

The worst-case scenario considers the same conceptual wetland design but assumes that contaminated soil and rubble and polluted water conditions exist. Development of the proposed mid-channel wetland site under such conditions would be difficult. This scenario assumes that sediments and soils have been substantially contaminated by past land uses, e.g., the hazardous waste shipping terminal along the southeastern shoreline of the channel and railroad facilities, and by indiscriminate dumping of industrial and/or hazardous waste materials on land and into China Basin Channel. The scenario assumes that underground storage tanks scattered throughout the Project Area, and in particular the tank at the mid-channel wetland site, may have leaked into the groundwater, thereby contaminating groundwater seeping into the wetland areas. Under this scenario, removal of surficial soil and the upper layer of channel sediments would not adequately produce soil and groundwater conditions conducive to reestablishment of terrestrial and aquatic ecosystems or creation of new wetlands. Sediments and ground surfaces are assumed to be of inappropriate particle size for colonization of desired invertebrates and plants. Disposal of any contaminated materials excavated during dry dredging would not be considered for aquatic disposal, but would rather require upland disposal or treatment.

In the worst-case scenario, it would be difficult to develop any of the wetlands because of the inadequacy of the physical parameters to support healthy and viable wetland communities. The soils and water may contain contaminants that are limiting factors to vegetation, concentrate to toxic levels in organisms, cause genetic damage or result in other adverse effects. Illegal dumping of trash and pollutants may exacerbate the problem. The wetland sites could become little more than a mudflat or low-lying area occupied by weeds and plants of little habitat value. This could happen if the elevations of the created wetland do not allow adequate tidal exchange (or fresh water seepage) or the soils are too saline. The wetland must be engineered in such a way to overcome the physical problems of the site and allow wetland development. Such remedial measures may prove costly: these could entail removal of the entire 15 to 30 feet of fill and possibly some of the underlying mud and either remediation of that material or replacement with clean fill./29/

If the water quality is maintained or improved and the area is kept free of debris, the mid-channel wetland area created in 2000 would have become fully established by build-out, benthic infauna may reside in the deeper, tidally inundated areas and fish uses would be prevalent. The presence of a mature wetland would likely enable a greater diversity and abundance of aquatic organisms to survive there than in the year 2000. As noted previously, wetlands are used extensively as nursery grounds for many commercially and ecologically important fish species, which are, in turn, preyed upon by a variety of waterfowl and shorebirds. The wetland would also provide an important educational experience for many people who would otherwise not have seen a wetland at close range./30/

Two new wetland areas would be constructed by the year 2020, one on the southeastern shoreline of China Basin Channel between Piers 48 and 50 (China Basin wetland) and the other between Piers 54 and 64 on the southern bayfront of the Project Area (bayfront wetland). Among the three wetland sites, the China Basin wetland would be the most beneficial for aquatic organisms. The most southern wetland site, between Piers 54 and 64, would provide a new area of limited habitat for aquatic organisms. The China Basin and bayfront wetlands would be generally superior to the mid-channel wetland in habitat value due, in part, to better tidal circulation and flushing. Best- and worst-case scenario assumptions made above for the mid-channel wetland site discussion would also be applicable to the other two wetland sites.

Initial Phase of Development

Alternative B includes a small amount of modification of the edges of the channel in order to install edge treatments and no dredging of the China Basin Channel except for possible occasional maintenance dredging necessary to accommodate boat travel. In the initial phase of development, this would occur near the head of the channel at the pump station and along the south side of the channel near Owens Street. The shoreline edge treatments are similar in kind to those in Alternative A and would provide similar substrate and habitats, as discussed previously.

Alternative N

Under this Alternative, China Basin Channel would remain in much the same condition as now exists. Without dredging or development of edge treatments or wetlands, the channel would continue to exhibit low diversity in the benthic community.

MITIGATION

TERRESTRIAL AND WETLAND VEGETATION/WILDLIFE

Measure	Alternative	Description
M.1	A	Provide more large continuous blocks of open space and parklands in Alternative A. Small, narrow and disjunct patches of habitat support fewer animals than do large contiguous blocks. Several narrow strips of open space in the Alternative are located along the east ends of Fourth Street and Alameda Street, and along 16th Street extending northwest to the channel. Providing an equivalent acreage of open space adjacent to the planned open space along the channel would provide more valuable habitat for wildlife than would be provided in the narrow strips. Narrow strips of habitat can serve as movement corridors for wildlife when they connect large blocks of habitat. The narrow habitat strips do not serve this function as they are currently designed. To provide better connectivity of habitats, create wider strips of open space planted with vegetation types useful to wildlife between the larger open areas.
M.2	A,B,N	Establish vegetation as soon as possible after commencement of construction to maximize the length of time the habitat is available. Trees and shrubs would be larger and more mature by build-out, than they would if planting were delayed.
M.3	A,B,N	Plant fruit, nut and berry producing trees and shrubs in open space areas to increase the primary productivity of the site, providing food for birds.

Measure	Alternative	Description
M.4	A,B,N	Plant foliage buffers between open space areas and roadways and areas of high human activity to provide more tranquil open areas and decrease disturbance to animals. Native plants should be employed in this planting to the maximum extent possible.
M.5	B	To increase value to wildlife, provide contiguous unbroken blocks of open space and wetland habitats by consolidating open space and wetlands as described in the following measures:
M.5a		In lieu of developing the 13.2 acre mid-channel wetlands, develop at least 13.2 acres of wetlands adjacent to the proposed China Basin wetlands which has been identified as the preferred area for wetlands development in the Project Area./30/ That could be done partially along the channel and partially south of the China Basin wetlands. This would require an adjustment of the adjacent land uses currently envisioned for this Alternative.
M.5b		Develop the mid-channel area currently proposed as wetlands as park-like open space.
M.5c		Eliminate the proposed Hooper Street between the proposed open space and the channel.
M.5d		In lieu of developing seven acres of bayfront wetlands between Pier 54 and Pier 64, develop an additional seven acres of wetlands continuous with the China Basin wetlands at the Banana Triangle. This would require an adjustment of the adjacent land uses currently envisioned for this Alternative.
M.5e		In conjunction with M.5d, eliminate the proposed Daggett Street east of Fourth Street.

To help ensure successful creation of wetlands within the Project Area, consider the following design and construction measures (M.6–M.12)./30/ The measures are preliminary and would require refinement during preparation of a detailed design for the wetland.

Measure	Alternative	Description
M.6	B	Remove existing debris/fill in proposed wetland areas to an elevation at least 2 to 3 feet below the desired elevations of marsh restoration and then completely capped with clean dredge spoils./30/ These spoils should preferably have a high (greater than 90%) silt and clay content.
M.7	B	Enclose restoration areas by a "hard edge," e.g., a concrete retaining wall, which could also support a pedestrian footpath./30/ With a retaining wall of sufficient height (e.g., +10 feet NGVD or +1.4 San Francisco City Datum) it may be possible to keep any potentially contaminated groundwater out of the wetland area as well as provide a means to discourage human disturbance directly within the wetland. Such a hard edge would allow the entire outside perimeter between the water and the footpath to be developed as a wetland because it would not be necessary to take the slope gradually up to the elevation of adjacent open space areas. A wall would, however, cause some shading at its immediate base.
M.8	B	To maximize opportunity for education and observation of the wetland, provide educational displays along the footpath at the edge of the wetland. An observation tower could also be provided to allow an overview of the wetland and for observing bird life. However, public access should be designed to prevent intrusion into the wetland. Specific measures that should be taken to achieve this include: constructing a fence between the footpath and the wetland high enough to prevent people from easily jumping or stepping over it, and planting upland vegetation along the wetland/footpath interface dense enough to discourage through traffic.

Measure	Alternative	Description
M.9	B	Level the design slope above the elevation of +2.8 feet NGVD (-5.8 feet San Francisco City Datum) to maximize the pickleweed zone within the wetland./30/ The elevation should be gradually increased to about +4 feet NGVD (-4.6 feet San Francisco City Datum) near the wall to enable a more natural appearing salt marsh to develop. At the base of the wall, heap sediment and upland soil to simulate a levee or place pilings to resemble a ruined wharf. Either of these constructs would function as refuge for small mammals and birds during the highest tides.
M.10	B	Grade islands to an elevation of +6 feet NGVD (-2.6 feet San Francisco City Datum)./30/ That would provide protected nest sites for birds and a refuge from high tides for small mammals.
M.11	B	Plant marsh areas with: 1. California cordgrass, Spartina foliosa, between +1 and +2.5 feet NGVD (-7.6 and -6.1 feet San Francisco City Datum). 2. Pickleweed, Salicornia virginica, Juamea, Juamea carnosa, and salt-grass, Distichlis spicata, between +2.5 and +4 feet NGVD (-6.1 and -4.6 feet San Francisco City Datum). Proportions should be 80% pickleweed, 10% jaumea, and 10% saltgrass. 3. Gumweed, Grindelia humilis, and Salt marsh lavender, Limonium californicum between +4 and +5 feet NGVD (-4.6 and -3.6 feet San Francisco City Datum). 4. Fat-hen, Atriplex patula ssp. Hastata, Australian saltbush, A. semibaccata, and coyote brush Baccharis pilularis, between +5 and +6 NGVD (-3.6 and -2.6 feet San Francisco City Datum)./24/ This will provide immediate vegetative growth in the marshes. Natural seeding is expected to be unreliable due to distance from seed sources./30/

Measure	Alternative	Description
M.12	B	Construct the wetlands islands with clean upland soil to provide a viable substrate for plant growth./30/
M.13	B	As part of the detailed design for the wetlands, set criteria for measuring the success of its establishment. Monitor wetlands on a six-month basis to ensure development of marsh vegetation. If plant survival and growth do not meet the set criteria, then remedial action should be taken. Such action may include re-assessment of the site and the goals of the wetlands and, if necessary, re-design and replanting of the site.
AQUATIC LIFE		
M.14	A,B	Limit wet dredging operations, including opening of lagoon at China Basin wetland under Alternative B, to between the months of March and November to eliminate any potentially significant impact of dredging on the Pacific herring fishery.
M.15	B	To establish and protect wetlands within the Project Area, conduct soil sampling of proposed restoration areas. That must occur before dry dredging or planting occurs so that the extent of any site-specific contamination and its potential for impacts to aquatic life can be determined, and the level of necessary clean-up or other mitigation established, as described for soils contamination in VI.N. Hazardous Wastes, beginning on p. VI.N.27).
M.16	B	To minimize shoreline erosion, construct the wetlands with gently sloping banks. Such a measure would reduce the probability of colonization by *Sphaeroma quoyana*, a destructive burrowing isopod that has been suspected of causing erosion of banks./27/

NOTES

SETTING

/1/ Nichols, D. R., and N.A. Wright, Preliminary Map of Historic Margins of Marshland, San Francisco Bay. Open-File Report 71-0216, U.S. Geological Survey, 1971, 10 pages.

/2/ CH_2M Hill Engineers, Emeryville, California, Mission Bay Study, prepared for Jefferson Associates, Inc., San Francisco, 1983.

/3/ Constance, L., "Frittilaria liliadea Rare Plant Status Report," California Native Plant Society, 1977.

/4/ Rick York, Botany Research Assistant, California Natural Diversity Data Base, Sacramento, personal communication, October 20, 1986.

/5/ California Native Plant Society, "Inventory of Rare and Endangered Vascular Plants of California," Special Publication No. 1 (Third Edition), 1984.

/6/ Brock, Thomas D., Biology of Microorganisms, Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 802 pages, 1979.

/7/ Censuses were conducted on foot, providing 100% coverage of the study area. Censuses were conducted between 11:00 a.m. and 3:00 p.m., requiring two hours each to complete. Binoculars and a spotting scope (20x) were used. All birds and mammals were identified to species, except for the Western Grebe/Clark's Grebe complex. Censuses were conducted only on days of optimum viewing conditions (i.e., no or light wind, 55-65°F, generally fair skies).

/8/ U.S. Fish and Wildlife Service, U.S. Department of the Interior, "Endangered and Threatened Wildlife and Plants," 50 CFR 17.11 and 17.12, 1986.

/9/ Laudenslayer, W.F., Jr. and W.E. Grenfell, Jr., "A List of Amphibians, Reptiles, Birds, and Mammals of California," Outdoor California, 44(1):5-14, 1983.

/10/ CH_2M Hill Engineers, Bayside Overflows, report for City and County of San Francisco, 1979.

/11/ Philip Williams and Associates, Preliminary Analysis of Circulation Design for Mission Bay Project, San Francisco, 1986.

/12/ Anaerobic conditions refer to the state of an environment in which organisms live or grow with little or no atmospheric oxygen. The organisms typically obtain their oxygen by decomposing compounds containing oxygen.

/13/ Spratt, Jerome D., "Status of the Pacific Herring, Clupea harengus pallasii, Resource in California, 1972 to 1980," California Department of Fish and Game, Fish Bulletin, (171): 1-107, 1981.

/14/ Reilly, Paul N. and Thomas O. Moore, "Pacific Herring, Clupea harengus pallasii, Studies in San Francisco Bay and the Gulf of the Farallones, June 1984 to March 1985," California Department of Fish and Game, Marine Resources Administration Report 85-4: 1-73, 1985.

/15/ Eldridge, M.B. and W.M. Kail, "San Francisco Bay Areas' Herring Resource -- A Colorful Past and a Controversial Future," U.S. National Marine Fisheries Service. Marine Fish Review 35(11): 25-31, 1973.

/16/ Robert Tasto, California Department of Fish and Game, interview, October 21, 1986.

IMPACT

/17/ San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan, adopted January 1969, amended July 1979.

/18/ Martin, A. C., H. S. Zim and A. L. Nelson, American Wildlife and Plants, A Guide to Wildlife Food Habits. Dover Publications. New York, 1951.

/19/ Verner, Jared, and Allan S. Boss, technical coordinators, "California Wildlife and Their Habitats: Western Sierra Nevada." Gen. Tech. Rep. PSW-37, 439 p., illus. Pacific Southwest Forest and Range Experiment Station, U.S. Department of Agriculture, U.S. Forest Serv., U.S. Dep. Agric., Berkeley, California. 1980.

/20/ McCaskie, G., P. DeBenedictis, R. Erickson and J. Morlan, Birds of Northern California and Annotated Field List, Second Edition. Golden Gate Audobon Society, Berkeley, California. 84 p. 1979.

/21/ Ingles, L. Mammals of the Pacific States. Stanford Press, Stanford, California. 506 p. 1965.

/22/ Stebbins, R. C. A Field Guide to Western Reptiles and Amphibians, Second Edition Revised. Houghton Mifflin, Boston. 336 p.

/23/ San Francisco Department of City Planning. "Wetlands/Playfields," Special Study for Mission Bay, prepared by Danadjieva and Koenig Associates, 1986.

/24/ Josselyn, M., 1983. The Ecology of San Francisco Bay Tidal Marshes: A Community Profile. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-83/23. 102 p. 1985.

/25/ Pequegnat, W.E. An Assessment of the Potential Impact of Dredged Material Disposal in the Open Ocean. U.S. Army Engineers Waterways Experiment Station. Technical Report D-78-2. Chief of Engineers, U.S. Army, Washington, D.C. 1978.

/26/ U.S. Environmental Protection Agency. Quality Criteria for Water 1986. Office of Water Regulations and Standards, Washington, D.C. EPA 440/5-86-001. 1986.

/27/ City and County of San Francisco, "Bayside Overflows," prepared by CH_2M Hill Engineers, 1979.

/28/ Josselyn, Michael and James Buchholz. Marsh Restoration in San Francisco Bay: A Guide to Design and Planning. Technical Report #3. Tiburon Center for Environmental Studies, San Francisco State University. 104pp. 1984.

/29/ Grading to a depth of 30 feet could present the most conservative situation. It is possible that grading could be reduced by excavation of the lagoon bottom only somewhat deeper than the final grade level. Migration of toxins present in the underlying sediments into the water could be prevented by placement of impermeable materials such as impervious textile barriers and capping with several feet of clean fill. Whether such a system would ensure establishment of a viable plant community cannot be determined at this time. The textile barrier would have to be a strong material that would remain impervious for a long period. The overlying clean sediments probably would have to be at least four feet thick to ensure rooting of vegetation, and measures would have to be taken to protect the cap from erosion. This may present a more cost-effective solution to grading and protection of the marsh from contaminated sediments, but in the long run, it may not present a permanent solution to the problem and certainly would not eliminate the potential hazards.

/30/ Cuneo, K., "Feasibility Study, Wetland Habitat Creation at the Mission Bay Project Site," prepared for Environmental Science Associates, Inc., 1987.

N. HAZARDOUS WASTES

SETTING

This section describes from several perspectives the potential for hazardous waste contamination and deposits to be found in the Project Area. The first subsection describes the regulatory framework for hazardous waste. The second section describes the progression of land filling and current knowledge, obtained mostly through recent borings, of the composition of the fill. The third subsection describes underground hazardous materials storage facilities known or suspected to be in or adjacent to the Project Area. Following discussion of underground facilities, the fourth subsection describes major types of historic industries that may have used hazardous materials or generated hazardous wastes. The fifth subsection deals with similar conditions for existing industries, including those uses that have the potential to affect public health adversely. The sixth subsection is a description of current surface conditions that might indicate the presence of hazardous waste deposits or soil contamination by hazardous materials.

Because past and present land uses adjoining the Project Area could result in surface or subsurface contamination, or affect public health inside the Project Area, adjoining lands within one city block (or for current industries those within about 2,000 feet) of the Project Area are included in this analysis. Those uses, activities or conditions outside the Project Area, however, are identified as such.

REGULATORY FRAMEWORK

San Francisco Fire Code

Article 29, added in January 1984, established a comprehensive system for processing permits, and for monitoring the use and disposal of hazardous materials (see discussion of this Article in Appendix L. Hazardous Wastes, p. XIV.L.1). The ordinance also established specific design and construction standards for underground storage tanks. The ordinance outlines provisions for handling abandoned hazardous waste storage facilities, as well as for maintenance of existing facilities.

Persons owning, leasing, or renting property who have reason to believe that an abandoned storage facility is located on their property must identify such a facility within six months of such knowledge. If an abandoned storage facility is identified, a plan for closing or upgrading the facility must be filed within 30 days. Any person who stores hazardous materials is responsible for the clean-up of any unauthorized or uncontrolled releases. The responsible party is required to clean up any unauthorized or uncontrolled releases, whether sudden or gradual. The provisions of this ordinance apply also to any establishment or storage facility owned or leased by the state or federal government. Ordinance No. 443-86, also known as the Underground Tanks Ordinance, amended Article 29 of the Fire Code and Article 21 of the Health Code to transfer authority for hazardous materials regulation from the Fire Department to the Department of Public Health (per the addition of Article 21 of the San Francisco Public Health Code).

San Francisco Public Works Code

Article 20 was added by Ordinance No. 253-86 (Analyzing the Soil for Hazardous Wastes adopted June 27, 1986; also known as the Hazardous Soils Analysis Ordinance) to require a site history and soil analysis for building permits on properties in designated portions of the City suspected of being contaminated with hazardous wastes. The Ordinance applies only to proposed work that would involve disturbance of more than 50 cubic yards of soil, on properties that have not been continuously zoned for residential uses since 1921. The Hazardous Soils Analysis Ordinance is discussed in Appendix L. p. XIV.L.8.

The designated portions of the City include property located bayward of the original high tide line as indicated by Historic San Francisco Maps, prepared by the State Lands Commission; the Project Area is included in this specified area. Other areas may be subject to the provisions of the Ordinance if designated by the Director of Public Works. Site history and soil analysis may include adjacent properties within 100 feet of the property line of the subject site. The Hazardous Soils Analysis Ordinance requires that a history of the site proposed for disturbance be prepared by a recognized historian, that the soil be sampled by a registered engineer or engineering geologist, and that the soil samples be analyzed by a certified laboratory for the presence of hazardous materials. The site history and soil analysis must be submitted to the Directors of Public Works and Public Health prior to issuance of the building permit application. If the concentration of any hazardous waste in the soil samples exceeds established quantitative standards, the applicant must submit a state or federally approved clean-up plan. Once site clean-up is completed, the appropriate certification is submitted to the Director of Public Health. The building permit application will then be deemed complete, and the application will be considered by the City.

San Francisco Bay Regional Water Quality Control Board (RWQCB)

The RWQCB is required to ensure adequate protection of water quality and statewide uniformity in siting, operation, and closure of waste-disposal sites in the San Francisco Bay Area. The RWQCB's participation in the regulation of hazardous wastes includes classifying all proposed or current waste disposal sites in the district, and reviewing and determining the adequacy of facility closure and maintenance plans submitted to the California Department of Health Services (DOHS), in regard to protection of water quality.

In 1983, the Cortese Bill (Assembly Bill 2013) established a state-wide inventory of underground tanks and designated the State Water Resources Control Board (SWRCB) as the implementing agency. In 1984, amendments to the federal RCRA (see discussion of EPA on p. VI.N.4) mandated such inventories, and the SWRCB was designated as the state agency to administer this federal EPA program. The RWQCB maintains a list of registered underground storage tanks at the direction of the SWRCB, and leaking underground storage tanks must be reported to the RWQCB. Owners of new tanks must notify the RWQCB within 30 days of installation. Permitting of underground storage tanks in San Francisco is done by City and County agencies, under the direction of the RWQCB.

Department of Health Services

The Department of Health Services (DOHS) is the primary state agency regulating public health, including hazardous materials and wastes. Because the Project Area has a long history as an industrial area (see The Origins and Evaluation of a Pioneer Industrial Area, mid-1860s to 1900 in VI.J. Cultural Resources, beginning p. VI.J.4, and Site History, p. VI.N.5), it is possible that hazardous wastes exist in Mission Bay, and that portions of the Project Area would fall under the regulatory jurisdiction of DOHS. Under Title 22, Division 4, Chapter 30 of the California Administrative Code, Hazardous Waste Control Law of 1972 (HWCL), DOHS is empowered to manage hazardous wastes by regulating generators, transporters, and disposers of materials defined as hazardous wastes (see discussion in Appendix L. p. XIV.L.5). A generator, defined as a person whose act or process produces a hazardous waste or whose act first causes a material to become subject to regulation, is obligated to determine if a waste is hazardous (and to determine if wastes do, in fact, exist on the generator's property). Through its Uniform Hazardous Waste Manifest, DOHS ensures that generators, transporters, and disposal sites all conform with existing regulations.

The DOHS is also empowered by the EPA to administer the federal Resource Conservation and Recovery Act (RCRA) within California. Although the two laws are very similar in many respects, the state's Hazardous Waste Control Law (HWCL) differs somewhat from RCRA, in that the HWCL clearly assigns to the generators of hazardous wastes the primary duty for safe disposal. The HWCL also puts greater emphasis than RCRA on recycling of wastes to reduce the need for land disposal. Regulations under HWCL are generally more stringent than under RCRA. HWCL and RCPA are discussed in Appendix L. pp. XIV.L.5 and XIV.L.2, respectively.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is the primary federal agency involved in regulating hazardous materials and hazardous wastes. Created in 1970 to coordinate federal environmental programs and enforce federal environmental regulations, EPA is charged with administering the Resource Conservation and Recovery Act of 1976 (as amended by the Hazardous Solid Waste Act of 1984, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or "Superfund"), and the Superfund Amendments and Reauthorization Act of 1986 (SARA) - see the discussion of those acts in Appendix L. p. XIV.L.1).

RCRA, as it is known, is a prescriptive statute that created a major new federal hazardous waste regulatory program. RCRA prohibited open dumping, established definitions of hazardous wastes, and established requirements for transportation, treatment, storage, and disposal of such materials. Its 1984 amendments severely limited land disposal, set a 1990 deadline for promulgation of land disposal restrictions for all hazardous wastes, and established regulations for existing and new underground storage tanks containing hazardous materials. RCRA is implemented by Title 40, Parts 260-271 of the Code of Federal Regulations. As with its other programs and regulations, EPA is committed to delegating its responsibilities in the areas of hazardous wastes and underground storage tanks to state (DOHS, SWRCB) agencies.

If portions of the Mission Bay site were found to be contaminated with hazardous wastes, they would become subject to the federal RCRA regulations, as well as parallel state regulations. Of particular importance are Part 261, "Identification and Listing of Hazardous Wastes," Part 262, "Standards Applicable to Generators of Hazardous Wastes," and Part 264, which describes required clean-up levels. EPA is revising the clean-up standards; the revised standards are expected to be more stringent.

CERCLA and SARA, as they are known, are respectively the original federal Superfund (1980) and the Superfund amendments and reauthorization (1986). Those Acts provide the EPA with authority to investigate hazardous substance releases, to clean up sites on the basis of EPA's Hazard Ranking System, to create funds for site remediation and victim compensation, and to determine rules of liability which favor compensation. SARA also focuses on the need for emergency preparedness and "community right-to-know," which relates to the community's access to hazardous waste information on industrial processes.

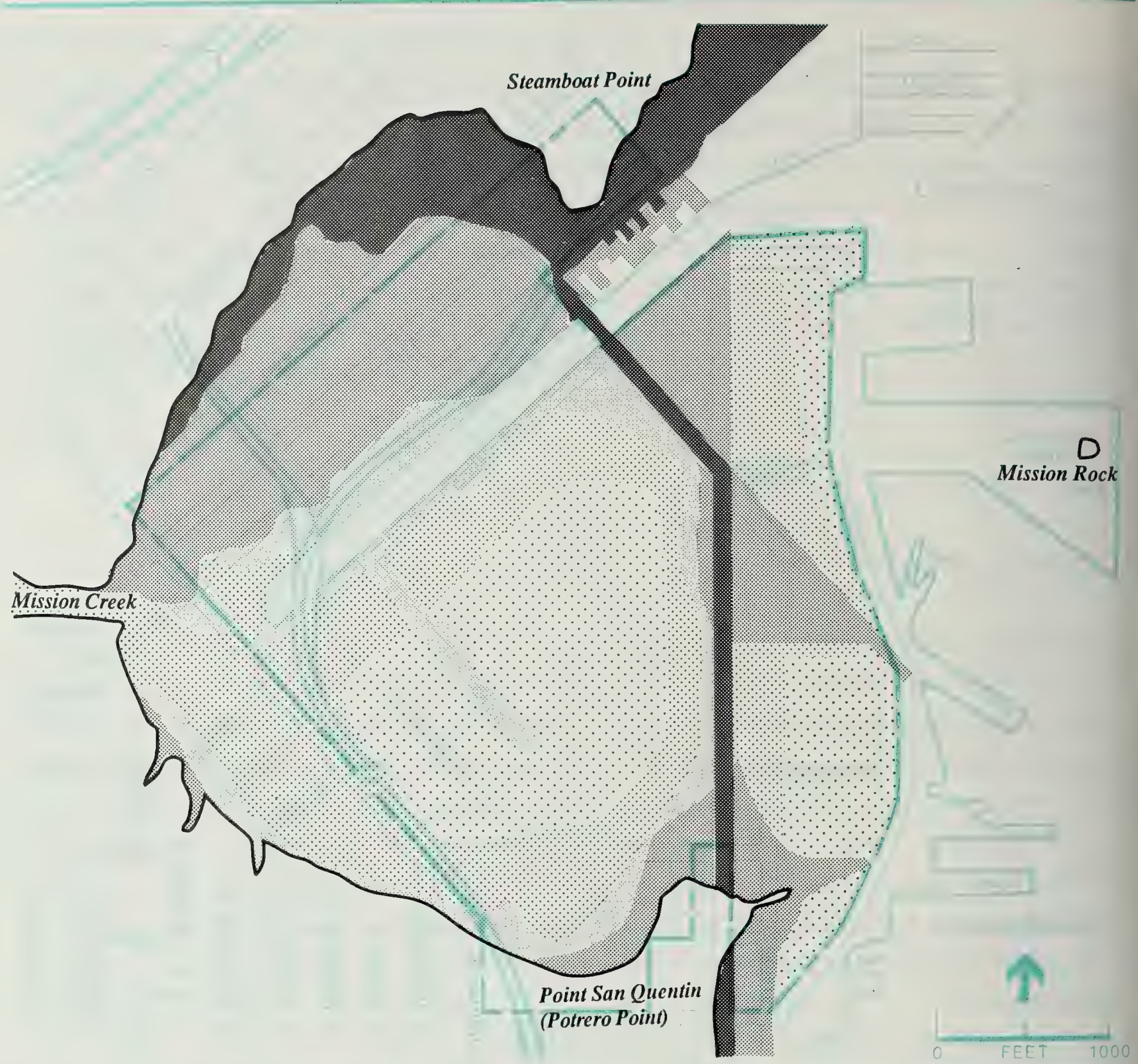
SITE HISTORY

Filling of Mission Bay

Progression of Fill and Fill Materials

The Project Area, originally marshlands and shallow tidal flats bordering San Francisco Bay, was filled during the last 130 years. Figure VI.N.1 illustrates the progression of fill in and around the Project Area. The filling of Mission Bay began between 1859 and 1869, when areas north and west of Steamboat Point (near present-day King Street, between Third and Fourth Streets) were leveled to obtain material with which to fill the northern edge of Mission Bay and the shoreline east of Steamboat Point. One of the first sources of fill was a 100-foot sand hill on Townsend Street./1/ In 1869, the construction of Long Bridge connected Steamboat Point on the northern edge of Mission Bay with San Quentin Point on the southern edge of Mission Bay, roughly along the alignment of present-day Third Street.

Between 1869 and 1877, the fill on the northern edge of Mission Bay was expanded, roughly along Townsend Street between Fourth and Sixth Streets, and wharves were constructed southward from Steamboat Point to what is currently the northern edge of China Basin Channel. Berry Street, between Third and Sixth Streets, existed as filled land in 1877./1/ During that period, large, triangular fills were placed east of Long Bridge, one forming the south side of China Basin Channel and one south of the present-day Fourth Street, east of its intersection with Third Street - perhaps for use as wharves. Long Bridge was widened, and areas north and east of San Quentin Point were filled. Fill materials during that period were, in part, dirt and rock from the Second Street cut in 1869 and serpentine rock blasted from Irish Hill./1/


Steamboat Point
Mission Rock
Mission Creek
Point San Quentin
(Potrero Point)
0
FEET
1000

— — MISSION BAY BOUNDARY

—— 1857 MISSION BAY SHORELINE (COAST SURVEY)

■ 1869 - LONG BRIDGE

▩ 1877

▨ 1884

▦ 1892

░ 1902 - 1913

FIGURE VI.N.1
PROGRESSION OF FILL

SOURCE: Environmental Science Associates, Inc.

By 1884, the margins of Mission Bay had experienced additional fill, decreasing its size, and a long, "T"-shaped, filled pier extended west and south into its center from Long Bridge, forming a portion of what is now the southern side of China Basin Channel. Additional fill was also placed on the northern side of the channel. Between 1884 and 1892, additional filling around the margins of Mission Bay finally enclosed it, shutting off the direct tidal flushing of the Bay. Additional fill was placed to the east of Long Bridge, roughly between the current alignments of Third and Illinois Streets.

From about 1878 to about 1895, the area south of Berry Street between Sixth and Seventh Streets was used as a city dump (see VI.J. Cultural Resources, p. VI.J.9). At its greatest extent, the dump covered as much as 20 acres south of China Basin Channel and accepted as many as 300 wagon-loads per day of trash and garbage. The garbage was shoveled into the waters of Mission Bay, slowly filling it in and seriously polluting the water. A community of human scavengers "squatted" in the dump, which subsequently became known as "Dumpville." They survived by collecting usable materials from the trash and garbage for personal use or resale./1/

The filling of Mission Bay was completed following the earthquake of 1906, when rail lines were used to transport building rubble and debris from the downtown to Mission Bay. In addition to filling in the central portion of the original Mission Bay, this material was used to fill areas to the east of China Basin Street, outside the Project Area, to approximately the current shoreline.

Soil Borings

Present knowledge of the composition of fill materials is based in part on knowing the approximate periods and major sources of the fill (e.g., sand hills, earthquake rubble) and, in part, on borings made for various purposes over about the past 25 years. According to a recent study by Dames & Moore, there are 300 previous borings on record for the Project Area, of which Dames & Moore considered 264 to be usable for describing subsurface conditions./2/ Those borings were made by Southern Pacific Transportation Company, the City Engineer, the Port of San Francisco, California Department of Transportation, Dames and Moore, and Geotechnical Consultants, Inc. Twenty-three borings were made in this area for the Clean Water Program's Bayside Facilities Plan in 1981. Added to these borings are seven test wells and four deep exploratory borings made by Dames & Moore for the Mission Bay project.

The available boring logs for the Project Area were recorded for purposes other than hazardous waste identification, so they are of limited value for the purpose of identifying hazardous waste deposits. These borings indicate that the Project Area was reclaimed with a variety of low-quality, heterogeneous artificial fill material. Most of the recent borings were made along the approximate alignment of Interstate-280 and around the Channel Street Pump Station. Borings in the Project Area encountered brick, wood, organic material, concrete, slag, glass, clay, shells, oil-contaminated sands and silts, asphalt, porcelain, metals, cinder, and cement./3/ In several locations the fill materials exist to a depth of 15 to 20 feet. Fill materials are typically present in two or three distinct strata, indicating either different types of fill, fill from different periods, or both. Two of the borings on Owens Street between I-280 and 16th Street, made for the Clean Water Program, show oil at a depth of three to five feet. Borings north and south of the Southern Pacific Railroad tracks, southwest of I-280, show evidence of oil at a depth of five to ten feet. The groundwater table is typically within the artificial fill.

Underground Facilities

The shallow subsurface zone of the Project Area (i.e., above the groundwater table) contains, or contained, approximately 49 underground storage tanks (USTs)./4/ In addition, there are approximately 51 underground tanks in the blocks of industrial development adjacent to the Project Area. As of June 1988, approximately 13 of the underground storage tanks formerly in use in the Project Area have been abandoned in place or removed. Of the approximately 49 existing and former tanks within the Project Area, 14 hold or held gasoline and 18 hold or held diesel fuel or oil. The contents of the other 17 tanks are unknown; they may have contained gasoline, diesel fuel, or one of a number of liquid industrial chemicals. The average size of underground storage tanks in and adjacent to the Project Area is about 5,000 gallons; the average age of these tanks, based on date of permit (tanks were in the area prior to the start of the permit program), is at least 15 years.

The project sponsor, other landowners, and tenants of the Project Area are engaged in active programs to remove underground storage tanks that are no longer in service. Operators of underground storage tanks in service are required to maintain permits. The City's program for permitting and tracking underground storage tanks, under the jurisdiction of the Department of Public Health, has not yet been implemented fully, so available information is fragmentary. All of the 49 tanks identified in the Project Area are permitted by the City.

Although the exact numbers and locations of tanks still in place in the Project Area are not entirely clear, the information available is sufficient to characterize the subsurface of the Project Area. Use of USTs in the Project Area has been pervasive over an extended period. Because of the number of tanks existing or formerly present in the Project Area, and the general tendency for metal tanks without corrosion protection to leak, it is likely that some leakage has occurred. Project Area soils are above average in salt content, the water table is shallow and brackish, and most tanks apparently were not cathodically protected against corrosion, so the potential for corrosion of steel tanks - and thus the percentage of leaking tanks - may be higher than average. Because of the predominance of gasoline and oil tanks, it is likely that most potential leakage is of petroleum products.

Historic Industries

Historic industrial uses of the Project Area are described in VI.J. Cultural Resources, beginning on p. VI.J.4. Industrial development in the Project Area generally followed the pattern of land filling. The earliest industries were near Townsend and Fourth Streets, and near Mariposa and Third Streets. As the Project Area was filled, industrial development spread around the margins of Mission Bay - southwesterly along the Folsom Street alignment and southeasterly along the Seventh Street alignment - and along Long Bridge (Third Street alignment). The last area to be converted to industrial use was the center of the Project Area, the area bounded by China Basin Channel on the northwest, Fourth Street on the northeast, Sixth Street on the southwest, 16th Street on the south, and Third Street on the east.

The potential for contamination by, and residual hazards from, historic industries in the Project Area varies by the type of industry and the period in which it operated. The Project Area and its vicinity were occupied by a large variety of industries over an extended period. Those industries included petroleum blending and storage, paint products, glass manufacturing, chemical manufacturing, shipyards, steel mills, asbestos storage, railyards, lumber yards, brick and hay storage, tanneries, warehouses, planing mills, wood products manufacturing, brick manufacturing, and gas plants, to name those of most interest. Some of these industries were limited in extent or in time to such a degree that no detailed analysis of their potential to produce hazardous wastes contamination or deposits is possible. Others clearly were benign from a hazardous waste perspective. The industries presented below were major industries in the Project Area and its vicinity, and were investigated for the potential to generate hazardous wastes (see Appendix L. Table XIV.L.2, p. XIV.L.10).

Petroleum Processing and Storage. Petroleum products were stored, and possibly blended, at eight different locations in the Project Area and at two locations near the Project Area. At nine of those ten locations, product storage was apparently the only activity. Hazards associated with those operations, such as product spillage or leaky tanks, may have left residues of tetraethyl lead from leaded gasoline, or polyaromatic hydrocarbons from petroleum oil. Product spillage may have left underground accumulations that still persist. Two of these operations, W.W. Montague & Co., outside the Project Area on Mariposa Street between Illinois Street and Third Street, and Union Oil, in the Project Area on the south side of 16th Street east of Illinois Street, have been active in the past 20 years. Product blending was apparently done only at Mohawk Petroleum, which was in operation for five years during the mid-1940s on the south side of Berry Street between Seventh and De Haro Streets, outside the Project Area.

Paint Products. Six companies dealing in paint products were known to be in or near the Project Area. Two of those, Pacific Oil and Lead Works, outside the Project Area on the south side of Townsend Street between Second and Third Streets from about 1867 to about 1913, and American Oil Company, in the Project Area on the south side of Berry Street between Sixth and Seventh Streets from about 1887 until about 1895, ceased operations more than 70 years ago. From 1903 to 1930, Southern Pacific operated a paint shop on the east side of Third Street near Fourth Street. Another, the Pacific Bridge Paint Company, was in the Project Area in the 1950s on the parcel bounded by Owens, Sixth and 16th Streets. Two others, C.L. Duncan Company, outside the Project Area on the south side of 17th Street between Mississippi Street and Pennsylvania Avenue from about 1948 to about 1956, and Pacific Coast Paper Mill, outside the Project Area on the south side of 17th Street between Texas and Mississippi Streets from about 1951 until about 1966, ceased operations prior to 1967. Several paint pigments contain lead, and some contain chromium or cobalt, so these materials likely were present in or near the Project Area. Pigments containing heavy metals such as lead can cause chronic illness or nervous system damage when regularly ingested for long periods.

A second potential source of residual hazards from paint manufacturing is dumping of the solvents used for cleaning paint-manufacturing equipment. The solvents themselves are volatile, and spills of these materials would not have persisted in surface soils for any length of time. Large spills or on-site disposal of used solvents could possibly contaminate groundwater. The pigments present in spilled, used solvents would have remained, presenting a hazard potential similar to that discussed for paint pigments, above.

Glass Manufacturing. Glass may have been produced at the following sites in and near the Project Area:

- Pacific Coast Glass Works, outside the Project Area on the western side of Seventh Street between Hooper and Daggett Streets from 1902 to 1930;
- San Francisco Glass Works, in the Project Area on the southern side of Townsend Street between Third and Fourth Streets from about 1867 to about 1871, on Fourth Street from about 1871 to about 1875 (as Newman & Derval), and on the southern side of King Street between Third and Fourth Streets from about 1875 to about 1900; and
- Pacific Glass Works, near the southern boundary of the Project Area from about 1893 to about 1877. The precise location of this plant is not known: it was located either near the intersection of Iowa (present-day Third Street) and Mariposa Streets or on Minnesota Street, just north of its intersection with Mariposa Street.

Three of those sites were in operation for a short period more than 100 years ago; two were in operation for over 25 years. Only one was in operation as late as 1930. Residues from glass manufacturing would consist of the raw materials or the finished products. The raw materials were primarily oxides of calcium, aluminum, magnesium, sodium, lead (for leaded glass only; the available record does not indicate whether leaded glass was manufactured in the Project Area), and potassium; minor raw materials (coloring agents) were oxides of arsenic, iron, copper, selenium, chromium, cadmium, and cobalt./5/ The finished products were primarily non-toxic, non-leachable silicates and borates. Once they were incorporated into glass, the concentrations of coloring agents would be greatly diluted and the rate of leaching of these materials and other adulterants out of the glass would be extremely low, because glass weathers very slowly and is largely impermeable to water. In fact, glass is one material currently being evaluated by state and federal agencies for use in encapsulating hazardous and radioactive wastes./6/

Chemical Manufacturing. No chemical manufacturing operations existed within the Project Area. Three chemical companies, however, operated within one block of the Project Area in the past:

- Golden City Chemical Works, on the northern side of Townsend Street between Sixth and Seventh Streets from about 1867 to about 1894, produced sulfuric and nitric acids. None of the raw materials - sulfuric acid, sodium nitrate, potassium nitrate - leaves insoluble residues, and soluble residues would have degraded long ago into stable and harmless nitrogen, potassium, sulfur, and sodium compounds, and been diluted into large volumes of soil. Sulfuric acid production by the lead chamber process may have generated scrap lead but, because of the prevalence of metal scavenging and the value of lead, it is unlikely that substantial amounts of lead were left on the site.

- Hochwald Chemical Company, on the southern side of 17th Street between Mississippi Street and Pennsylvania Avenue from 1940 to 1959, produced insecticides that probably included arsenic, copper, mercury, and lead compounds. Soil contamination could have resulted from spills of those materials. Some of those materials are moderately soluble in water and, if spilled on the site, would have dispersed somewhat during the past 30 years.

- Yosemite Chemical Company, on the southern side of 17th Street between Mississippi Street and Pennsylvania Avenue from about 1948 to about 1962, produced rust preventatives and rust removers. The active ingredients in these materials are organic acids, oils, paints, and anti-oxidants.

Shipyards. Shipbuilding, repairing, and related industries were represented in and near the Project Area by four companies:

- Boole and Beaton's Shipbuilding Yard, in the Project Area on the southern side of Berry Street between Fifth and Seventh Streets from about 1883 to about 1885;

- Alexander Hay's Shipbuilding Yard, in the Project Area on the south side of Berry Street between Fifth and Seventh Streets from about 1889 to about 1913;

- Bethlehem Shipbuilding Corporation, just outside the Project Area between Mariposa and 18th Streets, west of Illinois Street to Third Street, from about 1920 to about 1967; and

- Kneass Company Boat Building, outside the Project Area east of Illinois Street between 17th and 18th Streets, from about 1920 to about 1970.

Modern shipbuilding involves processing steel plate, including shearing, cutting, rolling, and welding. Residues of these activities would include cutting oil and oil/water emulsions (for lubricating and cooling the metal), and metal scraps and particulate. In addition, there might be asbestos (from insulation used for steam kettles and fire boxes), paint pigments (such as lead-oxide paints used on the underside of ships as an anti-foulant), and solvents.

Before about 1920, the boatbuilding industry may have used tar to seal wooden hulls. After about 1920, boatbuilding would have used fiberglass and various other resins, which required solvents for cleanup. The solvents, being volatile, would not persist on the site.

Resins spilled on the site may have hardened and cured to an inert, harmless material or may still be in a liquid state, depending upon their formulation and containment.

Steel Mills. Pacific Rolling Mill operated two steel mills just outside the Project Area from 1906 to 1928, one on the north side of 17th Street between Mississippi and Texas Streets and the other on the south side of 17th Street, that could have left steel-working residues similar to those described for shipyards.

Asbestos. Asbestos processing and storage took place at two locations within the Project Area and on one site just outside the Project Area. One company within the Project Area is known to have processed asbestos-containing raw materials. Plant Asbestos Company, south of 16th Street and east of Illinois Street, operating from about 1948 to about 1970, apparently was a warehouse. I.L. Merrell, on the north side of Townsend Street between Fourth and Fifth Streets, operating outside the Project Area from about 1881 to about 1889, apparently produced asbestos products. Commercial Mineral Company, between Sixth and Seventh Streets south of China Basin Channel between 1930 and 1961, processed an asbestos-containing mineral, tremolite, in its rock-grinding operations.

Rail Facilities. Major portions of the Project Area originally were filled to provide land for rail facilities. Rail facilities, consequently, have constituted a major use of the Project Area from the late 1800s to the present. Southern Pacific had a large roundhouse and engine house from about 1909 to about 1960 north of Mariposa Street between Third Street and the present alignment of I-280. Major Southern Pacific maintenance facilities were in the block bounded by Fifth, Sixth, Townsend, and Berry Streets from about 1935 until 1985. In the northeastern portion of the Project Area, east of Third Street and north of the Fourth Street right-of-way (now abandoned), the Atchison Topeka and Santa Fe Railway built an engine house and maintenance facilities in about 1916; the facility apparently operated until about 1967.

Rail yards and rail-related uses are considered to be a potentially hazardous land use. Rail yards in other parts of the Bay Area have been found to have extensive, but usually shallow, contamination with petroleum products and metals involved in operating and servicing locomotives and rail cars. Weed-abatement practices in rail yards may have included frequent spraying of ground surfaces with light oils or synthetic chemical herbicides. Rail cars, like the crates in warehouses, can hold a wide variety of materials, but rail cars hold much larger quantities. Thus, spills and leaks from rail cars could have led to shallow contamination of rail yard soils.

Hazards from Existing Industries

Permitted TSD Facilities

Three industries in and seven near (within 2,000 feet of) the Project Area are registered under the Resource Conservation and Recovery Act (RCRA) as hazardous waste Generator, Transfer, or Treatment, Storage, or Disposal (TSD) facilities (see Table VI.N.1). Such industries are regulated at the federal level by the Environmental Protection Agency (EPA), at the state level by the Department of Health Services (DOHS), and at the local level by the City and County of San Francisco Public Health and Fire Departments. Nine of the ten facilities are hazardous-waste generators, with eight of the nine each generating more than 1,000 kg (2,200 lbs) of wastes per month. Four of the facilities are transporters of hazardous wastes, and two of the facilities are permitted as disposal facilities.

Potentially Hazardous Industries

In addition to permitted hazardous waste TSD facilities, the Project Area contains numerous industrial firms that may handle small to moderate quantities of hazardous materials. The Association of Bay Area Governments has identified, by Standard Industrial Classification (SIC), 40 key industrial types that use such materials (see Appendix L. Table XIV.L.3, p. XIV.L.21). Seventeen businesses in and seven near the Project Area fall within six of the 40 SIC categories: Paint and Varnish Manufacturing; Electroplating; Ship Building/Repair; Warehousing/Storage; Petroleum Gas Production/Distribution; and Sewage Systems.

The most common "hazardous" industries in the Project Area are warehouses and ship-building/repair. The amounts and types of hazardous materials associated with warehousing are difficult to assess; individual warehousing activities may or may not involve hazardous materials, and the types of materials are likely to change over time. Ship-building and repair activities can involve a wide variety of acids, solvents, flammable liquids, and other hazardous materials.

TABLE VI.N.1: PERMITTED HAZARDOUS WASTE FACILITIES IN OR NEAR THE PROJECT AREA/a/

Facilities Within the Project Area	Assessor's Parcel Number	Facility Type
H&H Ship Service Co. 220 China Basin Street	3880-1	Generator (3) Transfer
Pacific Motor Trucking Company 1355 Sixth Street	3810-7	Generator (1)
Salinas Valley - Santa Cruz Motor Express 1760 Third Street	3810-7	Transfer
Facilities Outside the Project Area		
C&M Plating Works 498 Sixth Street	3779-13	Generator (1) Disposal
Coach Specialties, Inc. 601 Mariposa Street	3996-11	Generator (1)
Continental Maritime of SF Piers 50 and 54	Pier 54 Pier 50	Generator (1) Transfer
Glidden Company 1000 16th Street	3833-1.2.3 3950-4	Generator (1) Disposal
Greyhound Lines, Inc. 480 Irwin Street 3820-1	3807-2.4 3808-1	Generator (1)
Sun Chemical Corp. 651 Brannan Street	3785-9	Generator (1) Transfer
Pacific Bell 329 Brannan Street	3788-27	Generator (1) Transfer

---

Class (1)	Generators of more than 1,000 kg per month of waste.
Class (2)	Generators of more than 100 - 1,000 kg per month of waste. Class (2) is not used in this Table.
Class (3)	Generators of less than 100 kg per month of waste.

/a/ Facilities holding DOHS / EPA RCRA permits, as listed by those agencies.

SOURCE: Environmental Science Associates, Inc.

Several businesses in the Project Area, while not indicated as "key" hazardous industries by ABAG according to their SIC classifications, are likely to store and use small quantities of hazardous materials. These firms include vehicle maintenance and repair facilities, vehicle body shops, vehicle storage, printing and lithograph shops, oxygen and flammable gas sales, scrap metal sales, paint shops, and trucking/transfer stations.

Surface Conditions/7/

Surface conditions are one indicator of potential hazardous waste contamination. Areas covered by buildings reveal nothing, but paved areas provide an indirect indication of the approximate location of underground facilities, such as underground storage tanks, deduced from fill tube, vent, and pump locations, or patched pavement following recent excavation. Unpaved open areas reveal subsurface conditions through stockpiled materials on the surface, absence of healthy vegetation, soil disturbance, and surface soil staining.

The most prevalent surface indication of potential subsurface contamination is soil staining by petroleum products. Staining along rail lines is common in the Project Area, but those stains are expected to reveal shallow contamination, probably entirely within one foot of the surface and limited, laterally, to the railbed. Occasional stains found in other locations in the Project Area may have resulted from small, individual incidents - such as crankcase oil from an automobile oil change. However, those stains may be the product of repeated dumping or of surreptitious dumping of a large amount in one incident (midnight dumping). The most serious indication of potential, widespread petroleum contamination of the soil in the Project Area is at Sixth Street Auto, an abandoned garage on Sixth Street (Assessor's Block #3835, Parcel 3). The unpaved soil surrounding the building on that lot has been soaked thoroughly with oil; there are also more than 30 old barrels of paint on the northwestern corner of that lot.

Another prevalent indicator of potential contamination is the lack of weeds or other vegetation, such as in the rail yards in the Project Area. While soils in the rail yards have not been tested, those areas are virtually weed-free, and even totally lacking in dead vegetation that might indicate growth of vegetation in recent years. On the basis of hazardous waste investigations of other rail yards and maintenance facilities in the Bay Area, and knowledge of the weed-abatement practices common in the past, it appears likely that rail yards in the Project Area were treated regularly with light oils, salt, or other chemicals for weed abatement.

Piles of trash, barrels, and other waste materials, such as broken asphalt paving and lumber, are found commonly on vacant lots in the Project Area. They indicate a general level of neglect, and some of the materials may cause very local soil contamination, but those conditions do not generally or necessarily indicate substantial subsurface hazardous waste deposits or contamination.

IMPACT

A number of industries historically present in the Mission Bay Project Area could have used, generated, or otherwise been involved with hazardous materials, as discussed beginning on on p. VI.N.9. Those include major industries involved with petroleum processing storage, paint products, glass manufacturing, shipbuilding, and railroad facilities. In addition, a variety of minor industries that may have used, produced, or stored smaller quantities of hazardous materials were active in the Project Area.

Soils in the Project Area have not yet been sampled or analyzed. The historical record, however, suggests that toxic residues in soil probably occur in many places in the Project Area. Rail yards, which may have been treated extensively with herbicides or pesticides, and other properties that have been occupied by industrial uses are especially sensitive./8,9/ Wooden remnants of buildings, fences, platforms, and sheds anywhere in the Project Area are likely to be contaminated with chemical preservatives./10/ Spills of oil and petroleum products are ubiquitous throughout the Project Area, especially in the old rail yards operated by Southern Pacific and Santa Fe railroads. Metal compound residues from many industries could persist. Remnants of hazardous materials spills or hazardous chemicals in sealed containers or tanks may occur at numerous locations in Mission Bay. The Project Area fill itself could contain a variety of hazardous substances, especially in the area formerly used as the city dump. Finally, isolated instances of "midnight dumping," where wastes from outside an area are secretly and illegally dumped at a site, could have occurred in the Project Area.

Throughout the build-out period in all three Alternatives, hazardous contaminants could be encountered during excavation, dredging, and site preparation, should the parcels to be developed not be properly surveyed for hazardous materials and cleaned up before construction commences. Undetected contaminants could also pose health risks for future occupants of the Project Area.

The Project Area is so large, and the range of historic activities and potential hazardous compounds so diverse, that many differences among Alternatives generally are not meaningful as applied to potential hazardous waste impacts. Many parcels in the Project Area have had multiple industrial uses and have the potential to be contaminated with nearly every hazardous substance listed in Table VI.N.2. For compliance with San Francisco's Hazardous Soils Ordinance (see p. VI.N.2), the soil throughout the

TABLE VI.N.2: HAZARDOUS MATERIALS LIKELY TO BE ENCOUNTERED IN THE PROJECT AREA/a/

	Hazardous Properties					
Material	Toxic	Corrosive	Ignitable	Reactive	Carcinogenic/b/	Bioaccummulative/c/
Acetone			X			
Arsenic sulfide(s)	X				X	X
Asbestos	X				X	
Benzene	X		X		X	
Cadmium oxide	X	X		X	X	
Calcium oxide		X		X		
Chromium trioxide	X	X		X		
Copper acetate	X					X
Copper acetoarsenite	X				X	X
Creosote and coal tar	X				X	
2,4-D	X					X
DDD / DDT	X				X	X
Diesel fuel / Gasoline			X			
Magnesium			X	X		
Mercury compounds	X					X
Nitric acid	X	X				
Pentachlorophenol	X					
PCBs	X				X	X
Selenium dioxide	X					X
Sulfuric acid	X	X				
Tetraethyl / Tetramethyl lead	X		X			
Toluene / Xylene	X		X			
2,4,5-T	X				X	

/a/ Information derived from CAC, Title 22, Division 4, Chapter 20, Article 9, 1985; Sitting, 1985; Weiss, 1980; and U.S. Coast Guard, 1984.

/b/ Capable of causing cancer in animals or humans.

/c/ Capable of being taken up by plants or animals, stored or concentrated in living tissue, and passed up the food chain to other animals or humans.

SOURCE: Environmental Science Associates, Inc.

Project Area would have to be tested prior to obtaining building permits for development of each parcel under all Alternatives, since the land use history of the Project Area indicates a high potential for hazardous material contaminants. However, some differences do exist in proposed schedules and patterns of build-out and future land use among the three Alternatives.

This subsection discusses impacts that hazardous materials potentially found within the Project Area might have on the various Alternatives and stages of project development. The hazardous waste potential, public health risk, and impacts of the hazardous materials most likely to be present in the Project Area are discussed on the basis of known past and current industrial activity.

The subsection describes briefly the potential sources, types, and environmental fates of hazardous materials, and goes on to discuss potential clean-up options and activities. It addresses the potential risk to public health; the sensitive receptors, such as workers, residents, and wildlife; and the potential types and pathways of exposure. For 2000 and Build-Out/2020, this subsection generally describes the relationship between development of the Project Area and ongoing site investigation and clean-up for each Alternative. Throughout, the section emphasizes the types of health impacts that could be expected. The possibilities for treatment, removal, and other clean-up options and their potential impacts are discussed generally.

A separate document, the draft Mission Bay Project Hazards Mitigation Program (the Mitigation Program), has been prepared and is incorporated by reference into this EIR./8/ The Mitigation Program contains a parcel-by-parcel summary of information available on historic and existing industrial uses in the Project Area, a summary of known subsurface investigations, a general description of site investigation and remediation methods and approaches, specific recommendations on additional site investigation, and an overall framework for phasing remediation procedures, if necessary for the Project Area. While the Mitigation Program presents general recommendations for site investigation and clean-up, the actual investigative and (if necessary) remedial methods would comply with applicable laws at the time of implementation, and would be conducted under the direction and with the approval of all local, state and federal agencies having jurisdiction. The existing legislative authorities of various local, state and federal agencies in the area of hazardous wastes are described beginning on p. VI.N.1. The Mitigation Program would not apply to Alternative N, the No-Project Alternative, for which there would be no overall development plan. Site investigation and clean-up for Alternative N would be carried out on a parcel by parcel basis as a result of individual development proposals as development proceeded.

HAZARDOUS WASTE POTENTIAL

Potential Sources of Hazardous Materials in the Project Area

Hazardous materials in the Project Area would be primarily residues of various industrial, commercial, and landfilling activities. Many hazardous materials could have been spilled on the site during normal use. Others may have been disposed of or stored on the site. Still others could have been spread deliberately to control weeds or pests -- as is evidenced by the condition of many of the rail yards -- or applied to structures as wood preservatives. Until the Project Area parcels are sampled, the presence of dispersed toxic materials at concentrations that exceed state of federal standards cannot be confirmed. Maps showing Mission Bay parcels that had various historic heavy industrial uses of types that would have been likely to expose the Project Area to hazardous materials are presented in Figures VI.N.2, VI.N.3, and VI.N.4. Because of gaps in the historical record and the possibility of dumping, the lack of a known historic industrial or rail use on a parcel should not be taken as implying that the parcel is uncontaminated.

A hazard could exist from ruptured, leaking, or damaged containers and underground storage tanks that may still be stored or buried in the Project Area. (Excavation, dredging, grading, and surcharging plans that might unearth, spread, or otherwise disturb toxic materials were described in VI.K., Geology and Seismicity, beginning on p. VI.K.19.) Finally, several industrial facilities still exist on the site; two of them generate hazardous waste in their industrial activities and processes, and have been issued the appropriate state and federal permits required for hazardous-waste generators.

Potential Types of Hazardous Materials in the Project Area/11,12/

Hazardous substances fall into one or more of four categories, depending on their physical and chemical properties: reactive, ignitable, corrosive, and toxic./13/ These categories are not mutually exclusive; for example, a substance can be both toxic and ignitable. The Project Area may contain hazardous substances in any of these categories, although materials in the toxic group are the most likely to be present because of their generally greater environmental persistence. Table VI.N.2, p. VI.N.19, presents a list of materials

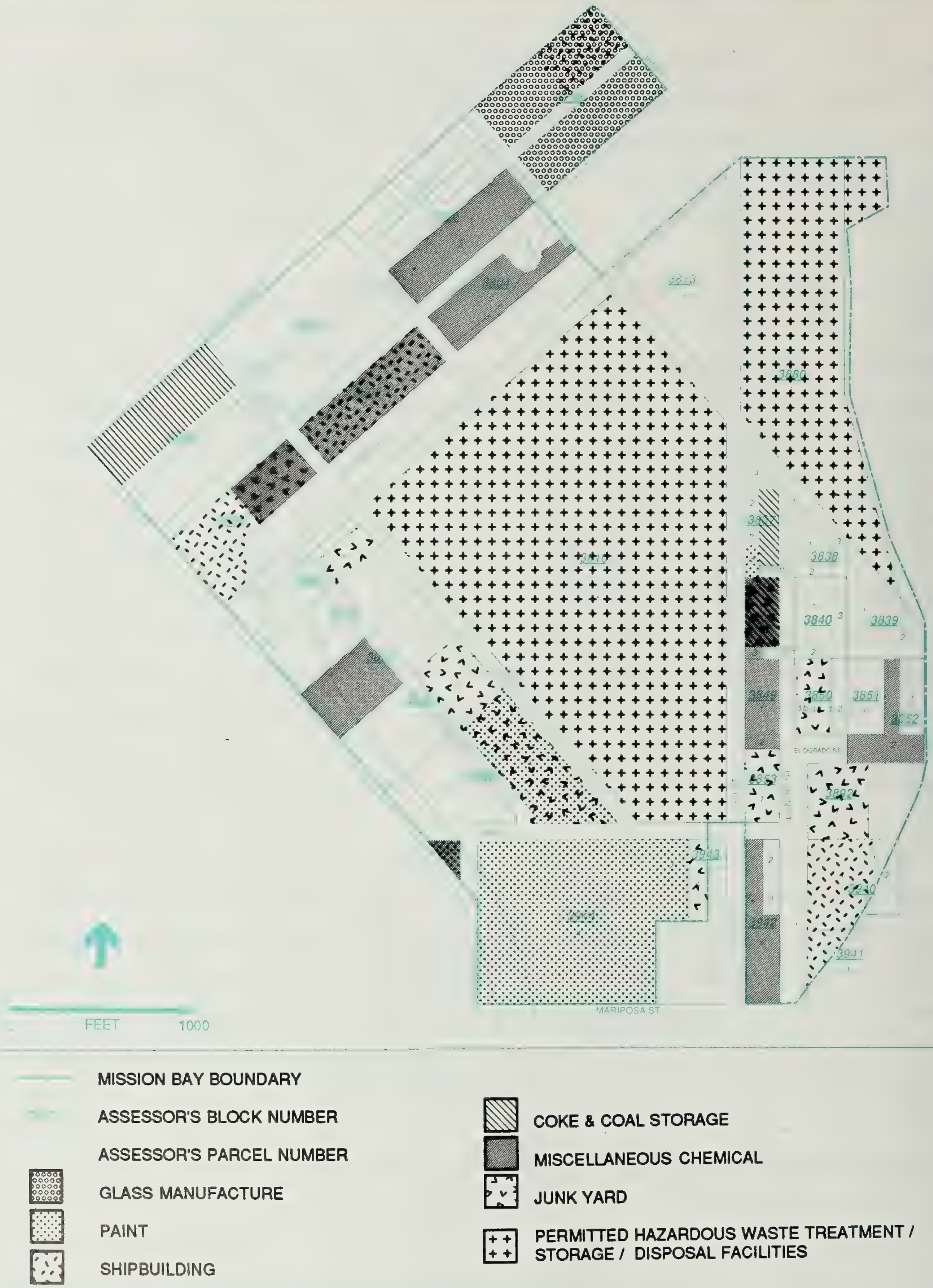
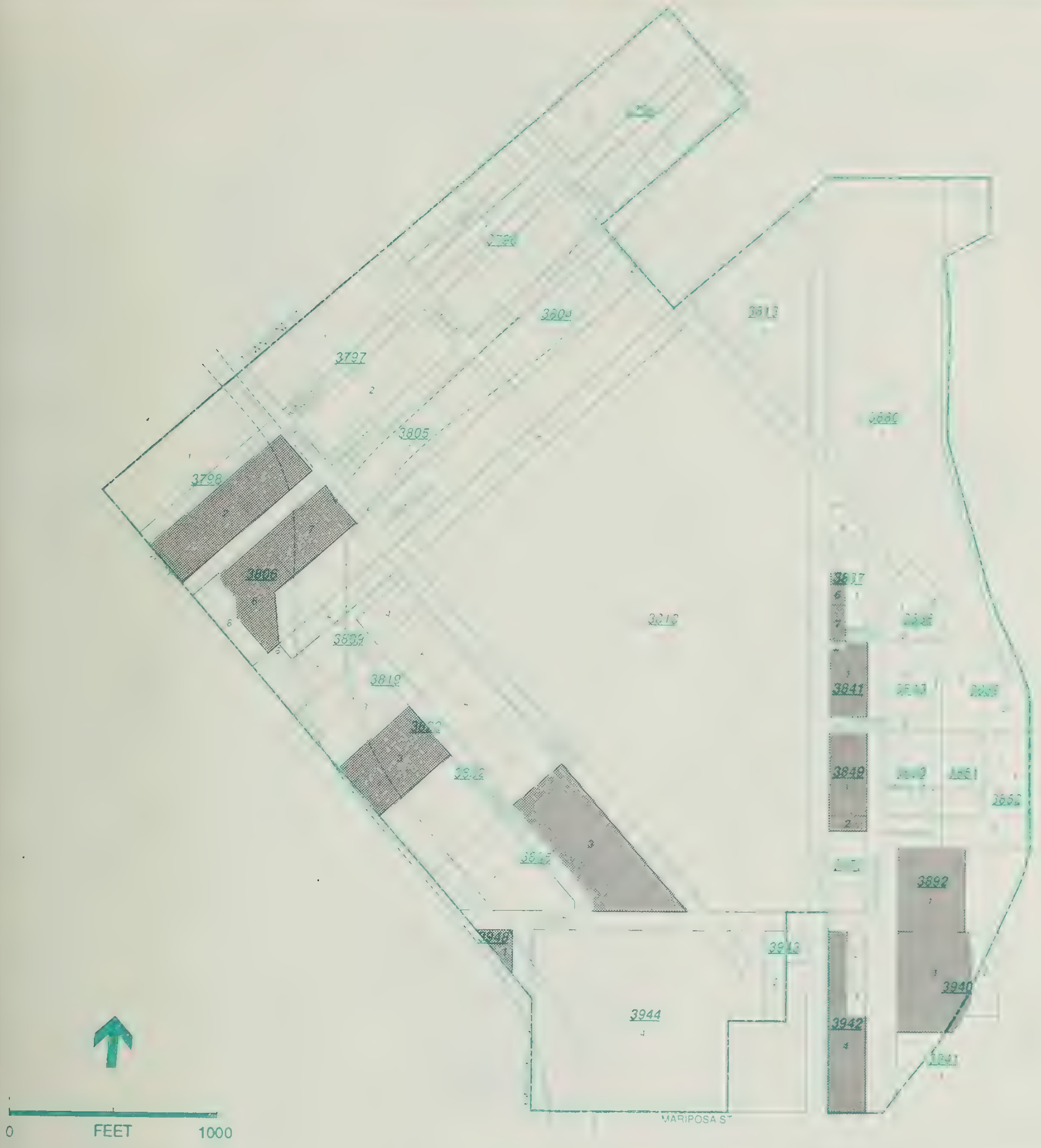

3813
3880
3838
3840
3839
3849
3850
3851
3852
EL DORADO ST
3943
3940
3942
3941
MARIPOSA ST
FEET
1000
MISSION BAY BOUNDARY
ASSESSOR'S BLOCK NUMBER
ASSESSOR'S PARCEL NUMBER
GLASS MANUFACTURE
PAINT
SHIPBUILDING
COKE & COAL STORAGE
MISCELLANEOUS CHEMICAL
JUNK YARD
PERMITTED HAZARDOUS WASTE TREATMENT / STORAGE / DISPOSAL FACILITIES

FIGURE VI.N.2
MISCELLANEOUS HISTORIC HAZARDS - SENSITIVE INDUSTRIAL USES IN THE MISSION BAY PROJECT AREA BY PARCEL

SOURCE: Environmental Science Associates, Inc.


3797
3804
3813
3805
3880
3798
3806
3809
3810
3819
3837
3841
3849
3892
3948
3943
3944
3940
3942
MARIPOSA ST
0
FEET
1000

—·— MISSION BAY BOUNDARY

3941 ASSESSOR'S BLOCK NUMBER

· ASSESSOR'S PARCEL NUMBER

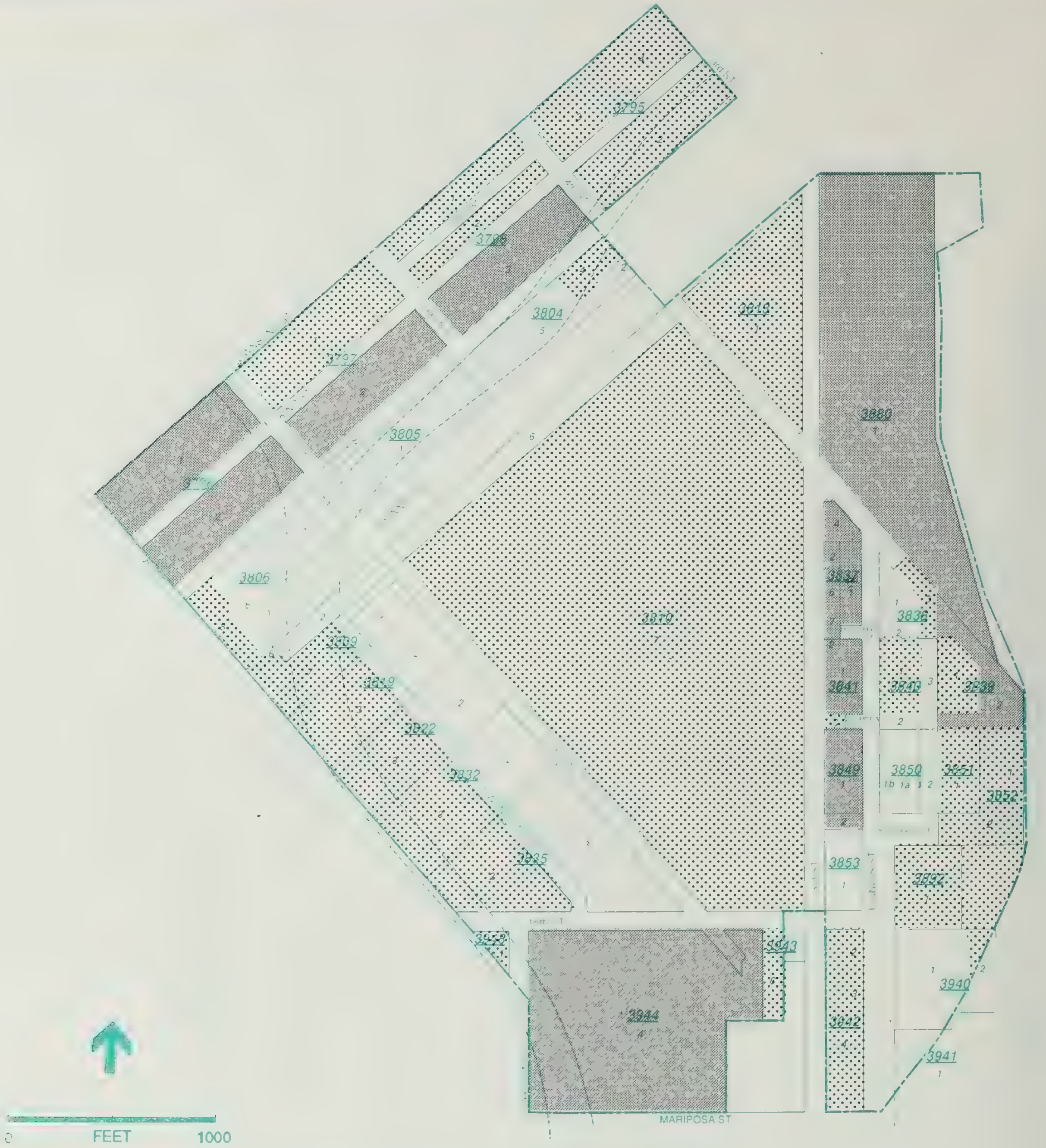
▨ OIL STORAGE AND PROCESSING FACILITIES

NOTE: Figure does not show rail-related oil product storage or existing uses.

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE VI.N.3
HISTORIC OIL INDUSTRY USES IN THE
MISSION BAY PROJECT AREA BY PARCEL


3795
3796
3797
3798
3804
3805
3806
3809
3819
3822
3832
3835
3870
3880
3837
3836
3841
3843
3839
3849
3850
3851
3852
3853
3942
3943
3944
3842
3940
3941
MARIPOSA ST
0
FEET
1000

—·— MISSION BAY BOUNDARY

3843 ASSESSOR'S BLOCK NUMBER

ASSESSOR'S PARCEL NUMBER

▦ RAIL TRACKAGE

▩ RAIL-RELATED REPAIR, MAINTENANCE AND SERVICE FACILITIES

NOTE: Rail uses in streets not shown

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE VI.N.4
HISTORIC RAIL-RELATED USES IN THE MISSION BAY PROJECT AREA BY PARCEL

identified as being most likely candidates to be found in the Project Area. Key hazardous properties (reactive, ignitable, corrosive, toxic) are listed, as well as two additional related properties of concern: the documented ability to cause cancer in living organisms (carcinogenic) and the documented ability to accumulate in the food chain (bioaccumulative). (See the Environmental Fate/Risk Assessment subsection of Appendix L. p. XIV.L.29 and Table XIV.L.4, p. XIV.L.22, for additional information on sources and properties of hazardous chemicals.)

Reactive Materials

Reactive materials have properties of explosivity or violent chemical activity. Chemicals classified in this group that could possibly be found in the Project Area include calcium oxide and magnesium metal. Neither of these materials, however, could be present as dispersed pollutants in soil or water. Both react with water (especially if the water is acidic) and could persist on the site only if kept in tightly sealed containers. If not properly handled, they could pose a hazard to construction workers during site preparation activities. Aside from the reactive nature of these materials, their toxic properties are not severe and would be limited to temporary irritation of eyes, nose, and throat.

Ignitable Materials

Ignitable materials are those capable of being set on fire, of bursting into flame spontaneously, or being ignited through interaction with another substance. These include acetone, benzene, gasoline, diesel fuel, tetraethyl lead, tetramethyl lead, toluene, and xylenes. All are common industrial solvents, fuels, or fuel additives, and most are volatile and mobile. The hazard of these materials lies in the danger of fire or explosion, should they be improperly stored or handled. Benzene, toluene, xylenes, tetraethyl lead, and tetramethyl lead also have toxic properties. Although all except acetone are insoluble in water, large or repeated spills of these liquids could result in contamination of the groundwater. This group of materials could pose hazards to workers or clean-up crews during site construction or preparation. In general, these materials are volatile and tend to disperse in the air. Like the reactive chemical group, these flammable liquids would not persist at or near the surface of the site in appreciable quantities unless they were stored in sealed containers. However, underground leaks of these materials could persist for years and possibly contaminate groundwater.

Corrosive Materials

Corrosive materials have the ability to dissolve organic and inorganic materials. Candidate chemicals in this group include cadmium oxide, calcium oxide, chromium trioxide, nitric acid, and sulfuric acid. All are commonly used in industrial processes. As with the reactive and ignitable groups, the corrosive properties of these chemicals would not persist indefinitely in the environment, but would be spent by contact with metals or organic matter such as wood, paper and plastic, which can be attacked and broken down by corrosive materials. Certain corrosive agents such as the acids can also be countered by minerals such as oxides, sulfides, or other natural materials that would act to gradually neutralize or remove the corrosives from the environment. Corrosive materials would have to be isolated in sealed containers in order to pose a hazard at the site. Calcium oxide is relatively non-toxic, but the other four chemicals cause severe damage upon contact with eyes and skin, and should be considered highly dangerous. These materials could present hazards to construction workers or clean-up crews during site preparation.

Toxic Materials

Toxic materials include both acute toxics and chronic toxics. Acutely toxic materials can cause injury, illness, or death to humans or other organisms as the result of a single exposure of short duration, or a single dose. Chronically toxic material can cause injury, illness, or death through prolonged or repeated exposures or consumption. This is the largest and most hazardous group of substances likely to be found in the Project Area. This group includes the flammable liquids benzene, toluene, xylenes, tetraethyl lead, and tetramethyl lead; the acute corrosives nitric acid and sulfuric acid; the metallic pollutants arsenic sulfide(s), cadmium oxide, chromium trioxide, copper acetate, copper acetoarsenite, mercury compounds, and selenium dioxide, all of which are poisonous; the industrial contaminants asbestos, creosote, and PCBs; and the organic pesticides and herbicides 2,4-D, DDT, DDD, pentachlorophenol, and 2,4,5-T. Some materials in this group, especially the metal compounds, pesticides, asbestos, and PCBs, display an environmental stability and persistence that makes them potential health threats on a long-term basis. Other materials, such as the flammable liquids, are relatively non-persistent. Public-health-related effects of toxics are discussed in the Environmental Fate / Risk Assessment subsection of Appendix L., p. XIV.L.29.

Environmental Fates of Hazardous Materials

Substances that are corrosive, ignitable, or reactive would tend not to persist on the site unless they were held in containers or storage tanks. As a general rule, materials in these three categories are chemically too reactive to persist for long in the environment. However, recent spills or leaks of these substances could occur at the site and persist for short periods. Chronic leaks could cause a long-term problem until found and corrected. Any containers of these materials found at the site would be removed during site clean-up.

The materials in the toxic group are chemically stable, relative to other types of hazardous wastes, and could persist for long periods in soil, structures, or groundwater. Some of these chemicals gradually detoxify through metabolic, chemical, or photochemical oxidation, but others display toxicities that do not decrease with time, or else degrade only slowly./11,14,15/ Many, especially the metal compounds and some pesticides, are very stable and will persist in the environment for years./16,17,18/ Some are relatively mobile in the environment, and soluble enough to contaminate groundwater at the site./19,20/ Some are taken up in the food chain and become concentrated in living organisms./10,15/ Appendix F. of the draft Mitigation Program discusses environmental fates of each hazardous chemical that could be found in the Project Area.

Volatile materials, if released at the ground surface, would evaporate and would not be expected to persist at the site. Non-volatile materials would be found in soils and on structures, building materials, debris, and trash. The primary site repository of hazardous contaminants would be surface soils contaminated by spills or other applications of hazardous materials, and filled parcels. Subsurface layers saturated with groundwater could contain a variety of hazardous materials, both in solution and associated with the substrate (fill or soil). Several pathways exist that allow contaminants to mobilize or move through the environment, and thus come into contact with sensitive receptors. These pathways include direct physical contact; transport in a dissolved or suspended form in water; transport as gas, vapor, aerosol, or dust in air; and transport by plants or animals through the food chain. These pathways are described more fully in Chapter IV. of the draft Mitigation Program.

CLEAN-UP OF HAZARDOUS MATERIALS

All three Alternatives would require excavation of surface soil on many parcels. Large amounts of excavation are planned for Alternatives A and B; in addition, Alternative A would require dredging in China Basin Channel. Much of the surface soil at Mission Bay may be contaminated to levels that would require either treatment or removal from the site; those levels are set by state and federal regulations. Treatment probably would be required for all three Alternatives. Differences in total volumes of soil to be excavated or dredged among the three Alternatives would vary the likelihood of disturbing or excavating contaminated soil or materials. Staged site remediation activities among sites within one phase or among phases of the project could increase potential effects of an individual site or phase. Relatively few people would be on site when clean up begins; consequently, relatively few people would be exposed to most of the effects of site changes. During following phases of construction, portions of the commercial, industrial, and residential uses of the project would be completed and most likely occupied. Consequently, site clean-up would affect an increasingly greater number of people during later phases of development, especially in the residential portions of the Project Area, where clean-up could occur near occupied residential units. (During site investigations for hazardous waste, buffer zones would be established that would undergo investigation and clean-up to minimize such interactions.) An extensive discussion of clean-up methods and treatment options is provided in Chapter VI. of the draft Mitigation Program.

If dredged materials contain high concentrations of hazardous materials, they probably could not be deposited at an approved disposal site in San Francisco Bay; like excavated soils, they probably would have to be treated or trucked from the Project Area to an approved landfill. Dredged material may require dewatering prior to removal to minimize volume and reduce the possibility of leakage during transport. More information on sediments is provided in VI.J. Hydrology and Water Quality, p. VI.J.10.

All of the hazardous waste materials potentially present in the Project Area can be removed or rendered harmless by means of existing technology. Some clean-up options, however, might be considered economically infeasible. The three types of cleanup possible for hazardous materials identified in the Project Area are on-site treatment and disposal, on-site internment, and off-site disposal.

Until recently, off-site disposal was the only treatment option for most wastes. On-site treatment, using methods such as stabilization, encapsulation, aeration, or contaminant extraction, is receiving increasing emphasis, but may not be practical for all wastes found in the Project Area. The ideal treatment would extract, remove, or otherwise decontaminate the hazardous material and render the substrate (usually soil) non-hazardous. Such technologies are developing rapidly, and will merit serious consideration in the future. On-site internment - sealing contaminated soils under a clay layer of low permeability, for example - may not be a permanent solution and perhaps would only postpone treatment or disposal. The potential for recontamination, due to a leak in the containment structure, would continue to exist. With hazardous waste regulations becoming more stringent and comprehensive at all levels of government, removal of wastes contained on the site may be required at a later date. Table VI.N.3 lists preferred treatment processes for the hazardous materials likely to be found in the Project Area. For Alternatives A and B, clean-up alternatives other than disposal are likely to be subjected to a higher level of regulatory scrutiny than for Alternative N, because of the residential and open-space uses proposed in the former.

Clean-up of hazardous materials discovered in the Project Area would be effected for reactive, ignitable, and corrosive materials by locating and removing any tanks or containers holding these substances, sampling the soil and substrate to determine the extent of contaminated materials, and subsequently excavating and trucking off any substrate contaminated by leaks or spills. For toxic substances, the same procedures would be followed, with the major addition of comprehensive soil and substrate sampling and analysis, followed by treatment of the hazardous material (probably by excavation and removal of contaminated soil or other material). Of the four types of hazardous compounds, those in the toxic and ignitable categories would be the principal contaminants expected to have persisted over time as soil contaminants in the Project Area. Reactive or corrosive materials would not persist for long in soil because of their characteristics, but could persist on the site in sealed containers.

Under all Alternatives, portions of the Project Area proposed for development (along with an appropriate buffer zone) would be investigated, and any necessary remedial work completed prior to development. The draft Mitigation Program presents an overall framework for confirmation investigations for master-planned Alternatives A and B. It provides for an Areawide Survey of the entire Project Area, consisting of surface soils and soil gas sampling. The Areawide Survey would be accompanied by detailed, programmed sampling and testing of soil, soil gas, and groundwater in the areas affected by each development phase (referred to as Development Phase Area Investigations) prior to the start of development for each phase. The Mitigation Program provides guidance as to which potential contaminants should be analyzed in surface soils, subsurface soils, groundwater, or soil gas. Specific sampling techniques, analytical methods, quality assurance, and other elements of the confirmation investigations are recommended in the Mitigation Program.

TABLE VI.N.3: PREFERRED TREATMENT PROCESSES FOR HAZARDOUS WASTES

	Treatment/a/						
Material	Physical	Thermal	Chemical	Biological	Immobilization	In-Situ Degradation	Soil Flushing
Acetone	X	X					X
Arsenic sulfide(s)				X			
Asbestos					X		
Benzene	X	X					
Cadmium oxide					X		
Calcium oxide			X				X
Chromium trioxide			X		X		
Copper acetate			X		X		
Copper acetoarsenite			X		X		
Creosote and coal tar		X					
2,4-D		X		X		X	
DDD / DDT		X	X				
Diesel fuel / Gasoline	X	X				X	
Lead, Tetraethyl / Tetramethyl		X	X		X	X	
Magnesium					X		
Mercury compounds	X	X			X		
Nitric acid			X				X
Pentachlorophenol		X	X	X		X	
PCBs		X	X		X		
Selenium dioxide					X		
Sulfuric acid		X					X
Toluene / Xylene		X		X		X	
2,4,5-T		X	X	X		X	X

NOTE: Information derived from Sitting, 1985; and Environmental Science Associates, Inc., 1988.

/a/ Physical treatment processes include evaporation, extractions, and mechanical scrubbing of the contaminant.
Thermal treatment is incineration by any method.
Chemical treatment includes neutralizing acids and caustics, oxidation or reduction, and chemical scrubbing of waste streams.
Biological treatment is microbial decomposition at secondary sewage treatment plants.
Immobilization is deposition in a remote hazardous waste repository.
In-situ degradation includes on-site microbial and photo-oxidation processes.
Soil flushing washes the hazardous material out of the substrate (usually soil); it can then be collected, concentrated if desirable, and treated. Following treatment, the material may be discharged into a sewer or to surface waters, if rendered completely non-hazardous, or disposed as are other hazardous wastes.

SOURCE: Environmental Science Associates, Inc.

As presented in the Mitigation Program, site clean-up activities would be isolated, as much as possible, from other site activities. Clean-up crew activities should be scheduled so that their work is sufficiently distant from construction activities on adjacent and nearby parcels. A buffer zone would be kept between clean-up work and initiation of construction activities on adjacent land where clean-up work has been completed. This precaution would minimize the likelihood that adjacent parcels would be disturbed by clean-up equipment or recontaminated by movement of fugitive contaminants. This buffer zone would be defined by the type of hazard and remediation technology, and would be maintained between clean-up activities and areas undergoing construction and occupation throughout all phases of project development.

Hazardous materials disposed of off-site would be transported to a Class I facility, as required by the Department of Health Services (DOHS) and the Environmental Protection Agency (EPA). Approval to truck wastes to a Class I site would have to be obtained in advance. The status of these facilities and the identities of wastes they are authorized to accept are often in a state of flux due to evolving regulatory rulings. Land disposal of many hazardous wastes is being phased out. Additional regulations and substantial changes in existing regulations for disposal can be expected prior to commencement of the first phase of development. A fuller discussion of disposal site availability and transport of hazardous wastes can be found in the Mitigation Program./8/

Excavation, dredging, and trucking may require temporary street closures and disturbances of existing industries, businesses, or residences. Trucks carrying hazardous wastes would be routed down major arterial streets to the nearest freeway access ramps -- via Third, Brannan, and Fifth Streets to the Bay-Bridge/I-80 ramp at the intersection of Fifth and Bryant Streets, or via Third and Brannan Streets to the I-280 ramp at the intersection of Sixth and Brannan Streets. Truck routes could be further refined, if necessary, to minimize conflict with existing and future on-site and off-site land uses as the Project Area develops.

Clean-up of hazardous materials discovered in the Project Area would be guided by federal, state and local laws. At the federal level, CERCLA and RCRA, and their amendments, are the primary legislative mandates that require remediation of hazardous facilities and contaminated properties (see the Hazardous Waste Regulation subsection of Appendix L. Hazardous Wastes, beginning on p. XIV.L.1). Much of the responsibility for implementing these laws has been delegated by EPA to the DOHS, the State Water Resources Control Board (SWRCB), and the Regional Water Quality Control Board

(RWQCB). Within the responsibility of both past and present property owners, contaminated sites must be cleaned up to the standards of the concerned agencies. At the local level, San Francisco's Hazardous Soils Analysis Ordinance requires a site history and site soil analysis for properties suspected of being contaminated with hazardous materials. This information must be provided, and a mitigation plan submitted to and approved by the DOHS and RWQCB, before building permits will be granted by the City.

Public Health Risk

Sensitive Receptors

Of the four types of hazardous materials, the chemicals in the toxic group pose the most serious concern for health-related impacts in the Project Area; all of the materials in this group are poisons and pose a hazard to humans and wildlife--some severely so./11,12,14,15/ Section IV of the Mitigation Program describes the potential health effects of these materials. If not located and treated or removed, these toxic substances could pose long-term health hazardous to clean-up crews and construction workers, as well as future residents, workers, and visitors. The most hazard-sensitive land uses included in the Alternatives would be recreational open space and residential areas. In addition, fish, songbirds, waterfowl, and other wildlife would be at risk from these materials, either from direct contact with hazardous chemicals or solutions of hazardous chemicals, or by taking up the toxics by inhalation or by ingestion with their food supply./11/ Commercial and industrial land uses would be less sensitive to the presence of hazardous waste contamination.

Types of Health Risks

As a group, these toxic materials cause the complete spectrum of acute biological ailments, from mild discomforts through various respiratory, gastric, and metabolic dysfunctions, to severe distress and death./15/ Chronic or delayed effects include cancer and birth defects in both animals and humans./11,14/ For most toxic compounds, the health risk is related to the level or frequency of exposure. Many compounds appear to have thresholds below which there is no observable effect. For other materials, however -- especially carcinogenic materials -- the threshold concentration appears to be zero (i.e., exposure to any concentration at any frequency is a health risk).

As an example of one type of toxic effect, if fumes were produced from a damaged or leaking container of benzene, inhalation of the fumes by clean-up crews, construction workers, or residents of the Project Area could cause dizziness, headache, respiratory congestion, and, eventually, loss of consciousness. This could occur with a single exposure of a few minutes' duration. Acute or repeated exposures to benzene are known to damage the liver and cause leukemia in humans. In addition, benzene is toxic to aquatic wildlife when dissolved in very low concentrations in water. Leaking containers of benzene would also be a serious fire hazard./11,14,15/

As another example, if residual DDT were present in soils in the Project Area, and if playing children should ingest soil particles contaminated with more than 500 ppm DDT, then symptoms would include facial tingling, headache, malaise, sore throat, and fatigue. Repeated or additional ingestion could produce tremors, confusion, paralysis, and coma in persons so exposed. As with all toxics, the severity of the reaction depends on the level of exposure, and the body weight and metabolism of the victim. For DDT, toxic effects would be seen after a single exposure to particulates in soil at a concentration of 500 ppm. The primary threat of DDT, however, results from its chronic toxicity and its potential to accumulate in body fats in both animals and humans. In addition to DDT's acute effects, this pesticide (now banned from use in the United States) can accumulate in the body and cause cancer and birth defects. DDT passes up the food chain and has been known to cause severe mortality to raptor eggs and chicks./11,14,15/

Table VI.N.2, p.VI.N.19 identifies hazardous materials potentially present in the Project Area, and indicates their reactive, ignitable, corrosive, and toxic properties. Known carcinogens and bioaccumulative toxics are also noted in that table.

Clean-up of any hazardous facilities or materials found in the Project Area, as described in the Mitigation Program, would itself carry some potential for public health impacts. Those impacts would depend to a large extent on the nature and amounts of material encountered, and the period during which clean-up were to take place. Direct hazards could be faced by clean-up crews and transportation workers./21,22,23/ Clean-up would pose indirect hazardous to nearby residents, businesses, visitors, wildlife, and others that might come in contact with fugitive materials at or near the clean-up site, or in transit. Without clean-up, however, existing risks to public health posed by hazardous materials would remain indefinitely.

There exists a related potential hazard to all involved parties from hazardous substances that might be overlooked during site survey and clean-up activities. Any overlooked materials might persist in the Project Area and pose a continuing, long-term hazard to construction workers, occupants, visitors, or wildlife in future years. For example, if any tanks of corrosive, reactive, or ignitable chemicals were not removed from the Project Area, the risk of accidental breaching or eventual leakage of their contents would always exist, leading to the additional possibility of fire or explosion. This danger would be a risk not only to clean-up crews and construction workers, but to residents as well./22,23/

If substantial amounts of friable asbestos or PCBs remained undetected in soils at the site, the risk of cancer would persist over the long term./11/ Herbicides such as 2,4-D and 2,4,5-T, present as residues contaminated with trace amounts of dioxins, could pose a similar hazard./18/ Those materials may be widespread in rail yards that have been defoliated; were those soils not to be cleaned up, a serious, long-term health risk would persist. If contaminants such as selenium salts or DDT persisted in the wetland areas in Alternative B, waterfowl and other wildlife might be subject to birth defects and deformities./9,16,24/

2000

Alternative A

All classes of hazardous materials are likely to be encountered in the portions of the Project Area to be developed by 2000. Lands to be developed include former oil industry operations at the southern tip of the site in parcels enclosed by 15th, Third, Mariposa and China Basin Streets; that is an area of potentially high contamination. Those parcels would be developed as S/LI/RD.

Both existing permitted hazardous waste generators (H&H Ship Service Co. and Pacific Motor Trucking Co.) are within the development area encompassed by Alternative A in 2000. The site occupied by the former is projected to be parkland and the latter would be MDR; investigation of those areas for hazardous wastes and any necessary remedial work would occur prior to development. Parcels in the center of the Project Area previously occupied by the former Southern Pacific rail yards -- areas potentially heavily contaminated with oils and pesticides -- would be developed predominantly for housing.

Projected excavated and dredged material volumes for this Alternative are intermediate between those of Alternatives B and N. Parcels to be excavated may be contaminated with toxic aromatic hydrocarbons, pesticides, wood preservatives, and heavy metal compounds. Containers of various chemicals also may be present, as well as soils contaminated with oil or fuel spills.

Initial Phase of Development. Lands to be developed in the initial phase include the northern corner of the Project Area, used in the past for shipbuilding, glass manufacturing, lumber yards, and rail-related uses, and the north-central portion of the Project Area used for rail-related uses. Parcels to be excavated may contain aromatic hydrocarbons, pesticides, wood preservatives, and heavy metal compounds. Soils could be contaminated with oil or fuel spills. The initial phase would include offices, open space, and MDR uses in those areas. The parcels to be developed and an adequate buffer zone would be investigated for hazardous wastes under the Mitigation Program, and any remedial action would be completed prior to development.

Dredging would occur in the initial phase of development to modify the edges of China Basin Channel. Sediments in the channel are known to be contaminated with a variety of materials--some of them hazardous--that have been transported into the channel from local surface runoff from dumping, and from flows from sewer outfalls. Dredging is described in VI.L. Hydrology and Water Quality, beginning on p. VI.L.24.

Alternative B

All groups of hazardous contaminants, with the possible exception of organic solvents, could occur in the area to be developed in 2000. One of the two existing permitted hazardous waste generators (Pacific Motor Trucking Co.) would be developed as MDR. The site of the former glass works near Third and Townsend Streets would become HDR. The rail yard bounded by Fourth, Townsend, Fifth and Berry Streets, currently occupied in part by the CalTrain commute station, would also be developed as HDR.

Excavation requirements, including dry dredging for wetlands, would be greatest for this Alternative, potentially maximizing the likelihood of encountering hazardous substances in substrate or groundwater. Disposal of excavated material from dry dredging would be subject to the same regulatory process as other land excavation discussed in this report. Many of the sites in the Project Area to be excavated, including the mid-channel wetland area, lie in the portion of the Project Area used as the city dump from about 1870 to about 1895. While that area probably would not contain buried pesticides or modern industrial contaminants, the former dump may contain a variety of materials such as metals, household solvents, and other chemicals, some in sealed containers. Parcels to be excavated may be contaminated with toxic aromatic hydrocarbons, pesticides, wood preservatives, and heavy metal compounds. Containers of various chemicals also may be present, as well as soils contaminated with oil or fuel spills. The groundwater in this area may be contaminated with such materials.

Alternative B, with its larger excavation requirements, would have a slightly greater potential than Alternative A to encounter subsurface hazardous waste deposits, underground storage tanks, or buried waste containers by the year 2000.

Initial Phase of Development. Portions of the Project Area that would be included in the initial phase of development once supported chemical, oil storage, and rail industries, and now support junkyards, among other industrial and warehouse uses. In addition, the initial phase of development would include portions of the former city dump. The former dump may contain metals, household solvents, and other chemicals. Parcels to be excavated may be contaminated by aromatic hydrocarbons, pesticides, wood preservatives, and heavy metals. The initial phase of development would include parkland and wetlands, offices, and MDR uses. The parcels to be developed in the initial phase and an adequate buffer zone would be investigated for hazardous wastes under the Mitigation Program, and any remedial action would be completed prior to development.

Alternative N

Excavation requirements would be less for this Alternative, and no dredging is planned. As with Alternatives A and B, however, all groups of hazardous contaminants could be encountered. The block bounded by Third, Townsend, Fourth, and King Streets -- the site of the former glass works -- would be developed as offices; the remainder of the land north of China Basin Channel would be little changed. Some retail and M-2 Industrial space would be developed in the Banana Triangle near the intersection of Third and Fourth Streets. Most of the Project Area would undergo little change in use. Rail yard use basically would be unchanged. Neither of the currently permitted waste generating facilities would be affected.

Impacts associated with excavation and dredging activities would be less than for Alternatives A and B. Alternative N is not master-planned and would not provide an opportunity for site investigation and remediation of hazardous wastes contamination in a comprehensive and coordinated manner, as under the Mitigation Program. Site investigations under Alternative N would not include an Areawide Survey of the entire Project Area, nor would they necessarily include buffer zones. Therefore, the potentials for: exposure of construction workers and project occupants to previously undiscovered wastes during excavation and grading; continued leaching of waste materials into the groundwater; and conflict between remediation efforts and ongoing activities of houseboat residents and project employees would be greater than for Alternatives A and B. Under Alternative N, the Project Area would still be investigated for hazardous waste, one development site at a time, under the provisions of the Hazardous Soils Analysis Ordinance.

Build-Out/2020

By 2020, distinctions between Alternatives A and B regarding hazardous materials would be minor, because, except for one Port-Related/M-2 parcel in Alternative A, the entire Project Area would be redeveloped. Alternative N, however, would have less new construction, possibly delaying clean-up. More existing land uses and structures probably would remain into the indefinite future.

Between 2001 and 2020, portions of the Project Area under all Alternatives would be undergoing development after increasingly larger portions were completed and occupied by residences, businesses, offices, and industries. Uncertainties regarding transport of hazardous materials to off-site disposal repositories, discussed above for 2000, would be more critical in the period between 2001 and 2020 (on the assumption that no new technologies for treatment of hazardous wastes are developed).

Alternative A

The extensive rail yards north of China Basin Channel that formerly held paint, oil storage, lumber, and shipbuilding industries, as well as portions of the city dump, would be converted to offices and S/LI/RD, with some HDR near the channel. The center of the Project Area that remained undeveloped by 2000 would be developed primarily into MHDR and MDR. The southern section of the Project Area (south of 16th Street) that formerly held paint industries and the Southern Pacific Railroad roundhouse, would be developed as S/LI/RD.

Alternative B

Alternative B would include development of the extensive rail yards north of China Basin Channel with MHDR and open space. The parcels containing the sites of the old railroad roundhouse and the former paint and glass industries in the southern portion of the site also would be developed as MHDR. The southeastern corner of the Project Area that received heavy oil-industry use would become MHDR and S/LI/RD.

Alternative B, with its greater excavation requirements for wetland creation, would have slightly more potential for health impacts than Alternative A because of the greater disturbances of potentially contaminated groundwater. Differences between Alternatives A and B, however, would be minimal because of requirements to test for hazardous wastes throughout the Project Area and to subsequently clean up any wastes discovered.

Alternative N

Alternative N would retain much of the existing rail yard use on the northern and western portions of the Project Area. The remainder of the Project Area would be primarily M-2 Industrial and Port-Related/M-2. In that regard, the potential for public health exposure from hazardous waste deposits would be less critical in this Alternative. The variations in rail yard development and heavy industry use between Alternatives A and B and Alternative N are the major differences by 2020 among the three Alternatives. In Alternative N, the Project Area might not be cleaned up until after 2020. If existing uses remain, and they might remain especially under Port-Related/M-2 use, then those parcels may not get timely clean-up.

Because Alternative N would not provide an opportunity for site investigation and remediation of hazardous wastes contamination in a comprehensive and coordinated manner and buffer zones might not be required, the potentials for: exposure of construction workers and occupants to previously undiscovered wastes during excavation and grading; continued leaching of waste materials into the groundwater; and conflicts between remediation efforts and ongoing activities of houseboat residents and Project Area employees would be greater than for Alternatives A and B. Under Alternative N, portions of the Project Area would still be investigated for hazardous wastes, as sites were redeveloped in piecemeal fashion, under the provisions of the Hazardous Soils Analysis Ordinance.

MITIGATION

HAZARDOUS WASTE POTENTIAL

This subsection describes in general terms the types and sequence of activities necessary to ensure that the Project Area is free of substantial industrial hazards prior to initiation of development. This subsection is, in large part, a summary of the mitigation recommendations contained in the draft Mission Bay Project Hazards Mitigation Program (the Mitigation Program). Measures N.1 and N.2 apply specifically to master-planned Alternatives A and B. For those two Alternatives, the Project Area would undergo a preliminary Areawide Survey of surface soils and soil gases, and a parcel-by-parcel subsurface soils and groundwater characterization, which would together constitute a comprehensive approach to remedial action. The Areawide Survey would cover the entire Project Area at the beginning of the project, and detailed Development Phase Area (DPA) Investigations would characterize specific portions of the Project Area in depth prior to their being developed. For Alternative N, no Areawide Survey would be required, and development would occur in a piecemeal fashion, which could result in partial or incomplete clean-up of the Project Area as a whole. All site investigations and any necessary remedial work under all Alternatives would be carried out in full compliance with all applicable laws and regulations. Site investigations are not expected to generate substantial adverse impacts. Depending on the technology used, remedial work could result in such impacts; however, these could require additional public health agency or environmental review.

Clean-up of Hazardous Materials

Measure	Alternative	Description
N.1	A,B	Comprehensive Areawide Survey. Evaluate the entire Project Area to locate and identify hazardous wastes deposited on the site. The Areawide Survey would cover the entire Project Area prior to the beginning of the first phase of development. it would include surface sampling and chemical analyses, and a subsurface soil-gas survey. The major objective of the Areawide Survey would be to identify possible chemical hazards in areas not being

Measure	Alternative	Description
		developed first, but which could pose a hazard during construction or subsequent habitation of the first phase of development in the Project Area. Those potential hazards have been identified as toxic substances at the land surface (which could present a hazardous exposure through dermal contact, ingestion or inhalation), toxic gases, and possible explosion hazards. The Areawide Survey would also include installation of monitoring wells at the perimeter of the Project Area to identify possible migration of contaminants into or out from the Project Area.
N.2	A,B	Development Phase Area Surveys. Evaluate in detail portions of the Project Area to be developed to characterize hazardous wastes prior to each phase of development. This investigation would include Stages 1 and 2 of the Mitigation Program. Comprehensive subsurface investigation of the DPAs corresponding to each phase of development (part of Stage 1 investigations for the DPA Investigations) would include drilling and sampling of soil borings and monitoring wells; geophysical surveys to locate possible buried tanks, piping and utilities; and other activities. The major purpose of the detailed, comprehensive subsurface DPA Investigations planned for each development area just prior to development would be to initiate and focus the remediation program for chemical hazards in the areas planned for development. Additionally, buffer zones would be established around the specific development areas which would also undergo comprehensive subsurface investigation at the same time. These buffer zones would be included to provide a mechanism for discovering and remediating potential chemical hazardous directly adjacent to a given development area before that area was inhabited. Use of such buffer zones would reduce the likelihood that in the

Measure	Alternative	Description
		future hazardous substances would be excavated or remediated adjacent to an already-developed area.
		A 300- to 500-foot buffer zone is proposed for each DPA Investigation in the Mission Bay Project Area. The size of the actual buffer zone for each DPA would vary depending on the location and proposed uses of the development area. For industrial, commercial and office uses, the buffer zone would be 300 feet; for residential uses the buffer zone would be 500 feet, except that in both cases the buffer zone would stop at a significant barrier, such as China Basin Channel or the border of a site which has already been investigated or developed. Buffer zones would not extend outside of the Project Area into adjacent land parcels.
		Surface samples would include soil samples and samples of foreign materials. Subsurface samples would include subsurface soil samples, soil gas samples, samples of subsurface foreign materials, and groundwater samples. In addition, an electromagnetic survey of underground storage tanks (USTs) would be carried out. Analytical methods to be applied to site samples would consist primarily of laboratory analyses by EPA-approved analytical methods that provide quantitative analytical results.
N.3	A,B	Coordinated Site Remediation. Develop separate site remediation plans for individual subareas within the Project Area to deal specifically with contaminants of concern detected during site sampling, in accordance with applicable State and Federal guidance for site clean-up. The primary objectives of site remediation would be to eliminate existing public health hazards and to minimize

Measure Alternative Description

the potential for future risks to public health and safety. These objectives would be achieved by preventing human contact with contaminated air, soil, or groundwater and by preventing migration of hazardous materials in air, soil, or groundwater. A secondary objective would be to minimize potential adverse effects on the environment, such as pollution of the Bay.

On the basis of federal and state guidelines, five categories of alternatives are to be considered in developing remedial activities./25/ These are:

1). Alternatives for treatment or disposal at an off-site facility;

2). Alternatives that attain applicable or relevant and appropriate public health and environmental requirements;

3). Alternatives that exceed such requirements;

4). Alternatives that do not attain requirements but would provide significant protection for public health and the environment;

5). No-action alternative.

Alternative clean-up measures might include soil removal, on-site containment, and on-site treatment (stabilization, extraction, incineration, or similar methods). For groundwater clean-up, measures might include groundwater pumping (dewatering), air stripping, extraction, and filtration.

Selection of remedial action alternatives and scheduling of remedial activities would be coordinated with plans and schedules for project development. Immediate risks to public health or wildlife would be addressed before

Measure	Alternative	Description
		initiation of site development. Where possible, remedial activities would be selected and planned to minimize interference with the project schedule. Approval of remedial plans would be sought at various stages of plan development by meetings among the project sponsor, contractors, and regulatory agency personnel. Recommendations for coordination with governmental agencies are presented in the Mitigation Program. To ensure good agency coordination, in addition to agency review and approval of cleanup plans, form an advisory panel consisting of the project sponsor, the agencies with specific or general jurisdiction over the Project Area or project development activities, city agencies, and other major and adjacent landowners such as the Port of San Francisco. This advisory panel would meet monthly to be advised of current activities on the site, review cleanup plans prior to implementation, and discuss other project-related issues that arose during site remediation.
N.4	N	Implement a planned, systematic cleanup of the entire Project Area for Alternative N, as recommended in Measures N.1 and N.2 for Alternatives A and B. Such an approach would greatly reduce the potential for public health impacts on construction workers, Project Area employees, and residents. Alternative N, because it is the No-Project Alternative and does not assume development would occur in the context of a coordinated development plan, would not afford the opportunity for such an approach. However,

Measure	Alternative	Description
		clean-up would proceed under existing laws and regulations on a parcel-by-parcel basis as new development were undertaken.
N.5	A,B,N	Implement the following safety measures at cleanup sites to protect workers on the clean-up sites and other individuals living and working near the cleanup sites from hazardous airborne dust and toxic gases that could be released:
N.5a		Prevent direct contact with hazardous soils or liquids by the on-site workers with the proper selection of safety clothing and equipment. The level of safety equipment required would be determined on a site-by-site basis. The level of safety equipment required (i.e. A,B,C) would be specified by site clean-up plans. Different safety levels could require disposable clothing, safety boots, safety gloves and respirators. This mitigation would protect on-site workers.
N.5b		Implement a dust control program similar to mitigation measure F.1 in the Air Quality section, if the dust from a site would otherwise be hazardous to on-site workers or nearby residents. The specific site clean-up techniques would determine the dust control measures to be implemented in a particular dust control program. The dust control program would require both routine and random oversight by an industrial hygienist. The industrial hygienist would make measurements, if necessary, to determine that resultant exposure levels to dusts are within appropriate standards. This mitigation would protect both on-site workers and off-site individuals.
N.5c		Create a safety buffer zone around the clean-up site if an on-site clean-up involves activities that present the risk of a toxic gas release. The size of the safety buffer zone must be large enough so that the immediate release of gases would not put off-site individuals in danger. This mitigation would protect off-site individuals.

Measure	Alternative	Description
N.5d		Develop an evacuation plan before before drilling or excavation in dangerous areas. This plan would require that safety actions (including evacuation) be taken if a gas release was of a long-term nature, or larger than expected. This mitigation will protect off-site individuals.
N.5e		Require on-site clean-up crews to monitor odors and fumes with appropriate explosive gas detectors or organic vapor analyzers. This mitigation will protect both on-site workers and off-site individuals.

NOTES

SETTING

/1/ Nancy Olmsted, Vanished Waters; A History of San Francisco's Mission Bay, 1986.

/2/ Dames and Moore, "Geotechnical Consultation, Mission Bay Project," 1982.

/3/ Susan Wickham, Registered Geologist, Geotechnical Consultants, Inc., letter, March 26, 1987.

/4/ Environmental Science Associates, Inc. compiled and analyzed information on underground storage tanks provided in 1986-7 by the Department of Public Health, the project sponsor, the Department of Health Services, and the Regional Water Quality Control Board; information was updated in April 1988.

/5/ R. Norris Shreve, The Chemical Process Industry, McGraw-Hill, 1945.

/6/ David Leu, California Department of Health Services, telephone conversation, April 7, 1987.

/7/ Environmental Science Associates, Inc. surveyed the Project Area for surface indications of hazardous waste contamination in April 1987.

IMPACT

/8/ Environmental Science Associates, Inc., Mission Bay Hazards Mitigation Program (Draft), San Francisco, August 1988.

/9/ Verschueren, K., Handbook of Environmental Data on Organic Chemicals, 2nd Ed., Van Nostrand Reinhold Company, New York, 1983.

/10/ Brown, A.W.A., Ecology of Pesticides, John Wiley & Sons, New York, 1978.

/11/ Sittig, M., Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd Ed., Noyes Publications, Park Ridge, N.J., 1985.

/12/ California Administrative Code, Title 22, Division 4, Chapter 30, Article 9: Hazardous Wastes and Hazardous Materials.

/13/ These four categories of hazardous materials are defined in the California Administrative Code, Title 22, Division 4, Chapter 30, Article 1.

/14/ Weiss, G., Ed., Hazardous Chemical Data Book, Environmental Health Review No. 4, Noyes Data Corp., Park Ridge, N.J., 1980.

/15/ U.S. Coast Guard, Chemical Hazard Response Information System: Hazardous Chemical Data, Volume II Commandant Instruction M.16465.12A, Department of Transportation, Washington, D.C., 1984.

/16/ Eisler, R, Chromium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, U.S Fish and Wildlife Service, Biological Report 85(1.6), Contaminant Hazard Reviews Report No. 6, January, 1986.

/17/ Eisler, R., Cadmium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, U.S. Fish and Wildlife Service, Biological Report 85(1.2), Contaminant Hazard Reviews Report No. 2, July, 1985.

/18/ Miller, G.C., and R.G. Zepp, 2,3,7,8-TCDD: Environmental Chemistry, U.S. Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, Georgia, EPA/600/D-37/086, March, 1987.

/19/ McKee, J.E. and H.W. Wolf, Water Quality Criteria, 2nd Ed., California State Water Quality Control Board, Publication No. 3-A, 1963.

/20/ Hem, J.D., Study and Interpretation of the Chemical Characteristics of Natural Water, 3rd Ed., U.S. Geological Survey Water-Supply Paper 2254, U.S. Government Printing Office, Washington, D.C. 1985.

/21/ Plunkett, E.R., Handbook of Industrial Toxicology, Chemical Publishing Co., Inc. New York, 1976.

/22/ Bretherick, L., Handbook of Reactive Chemical Hazards, 2nd Ed., Butterworth, London, 1979.

/23/ National Institute for Occupational Safety and Health, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, U.S. Department of Health and Human Services, October, 1985.

/24/ Eisler, R., Selenium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, U.S. Fish and Wildlife Service, Biological Report 85(1.5), Contaminant Hazard Reviews Report No. 5, October, 1985.

MITIGATION

/25/ U.S. Code of Federal Regulations, Title 40, Chapter 1, Part 300, "Natural Oil and Hazardous Substances Pollution Contingency Plan, 300.68, 7-1-86 edition.

O. GROWTH INDUCEMENT

IMPACT

This section provides a summary of implications of the Mission Bay Alternatives for growth in the City and the Bay Area region. Most growth inducement effects are described elsewhere in the EIR in terms of implications for citywide and regional growth and development patterns as well as implications for Nearby Areas. Those more detailed discussions are summarized and referenced here.

There are four main issues involved in considering the growth-inducing effects of large-scale development such as that represented by the Mission Bay Alternatives:

- "Net addition": the extent to which Project Area development would result in growth of business activity and employment or housing and population that otherwise would not occur in the City (or the region);
- The growth-inducing relationship between increases in employment and associated increases in population;
- The "multiplier" effect: "multiplier" is an economic term to describe inter-relationships among various sectors of economic activity. Consideration of the multiplier effect is an acknowledgement that Project Area employment and population growth is not the complete picture of growth from a broader perspective; and
- The "spillover" effect of Project Area development: the extent to which Mission Bay Alternatives would result in growth and change that otherwise might not be expected in areas near the Project Area.

Growth inducement issues are addressed for the Alternatives at full build-out. The discussion is organized according to the four main issues described above and not by Alternative. With this approach, the discussion focuses on comparison of Alternatives for each issue.

NET ADDITION

Development of the Mission Bay Alternatives would accommodate growth of business activity / employment and housing / population in the Project Area. Whether or not that growth would represent a net addition to economic activity in the City or region depends on location options for businesses and for housing development. Mission Bay development would contribute to increases in activity to the extent the Project Area would provide a location for business expansion and/or residential development that otherwise would not occur in the City or the region. Shifts in economic activity from one location to another (such as corporate relocations to the suburbs) may have distributional and local implications (e.g., economic loss for San Francisco, gain for suburban communities) but do not affect the overall level of activity in the area of interest (the region, in that example).

Net Addition of Business Activity and Employment

There would be growth of business activity and employment in the Project Area and in the City with all Mission Bay Alternatives. An Alternative would result in a net employment gain for the City (compared to another Alternative) if it would accommodate business activity and employment that had no other location options in the City, i.e., business activity and employment that would be in the City only as a consequence of the choice of that Alternative. Since some businesses that would locate in Mission Bay would have other location options in the City, some of the employment growth associated with Mission Bay development would not represent a net addition to citywide economic activity. Differences between citywide employment scenarios for each Alternative indicate the magnitude of the net addition to citywide employment of one Alternative compared to another.

The difference between the citywide scenario for the Alternative with the most employment growth (Alternative A) and the scenario for the Alternative with the least employment growth (Alternative B) would be about 9,200 more jobs in the City at build-out/2020 (see Table VI.B.27, p. VI.B.77). Mission Bay development under Alternative A would add about 5% more to citywide employment growth than would Mission Bay development under Alternative B. Since the citywide employment scenario for Alternative N would fall in between the scenarios for Alternatives A and B, comparing each of those Alternatives to Alternative N would indicate an even smaller difference in citywide employment growth. Compared to Alternative N, the changes in planning policy and zoning represented by Alternative A would result in about 3,300 more jobs in the City, about 2% more employment growth. Compared to Alternative N, the changes represented by Alternative B would result in about 5,900 fewer jobs in the City, about 3% less employment growth.

The differences between the scenarios of citywide employment for each Alternative are less than the differences in Project Area employment because some businesses that would locate in Mission Bay have other location options in the City, at least for a long time into the future. Consequently, much of what is counted as employment growth in the

Project Area in the scenario for one Alternative is counted as employment growth elsewhere in the City in the scenario for another Alternative. Thus, the choice between Alternatives would affect locations for development and business activity as well as the amount of development and business activity in the City. (See Implications for Nearby Areas, in VI.B. Land Use, Business Activity, and Employment, p. VI.B.106, for comparison of the scenarios for each Alternative in terms of the distribution of economic activity in areas surrounding Mission Bay.)

Mission Bay under all Alternatives would contribute to future regional employment growth. With the exception of potentially a few cases, business activity, and employment in Mission Bay would not represent a net addition to total regional economic activity, however. That is because most of the businesses likely to locate in Mission Bay would have other location options elsewhere in the region if not in San Francisco. Therefore, more growth of business activity and employment in Mission Bay in one Alternative compared to another represents the shift of economic growth from locations elsewhere in the region to the Mission Bay Project Area. There could be a few cases of businesses choosing Mission Bay as their only Bay Area location. That would be most likely with Alternative A. Such businesses would be back-office operations, light industrial companies, research and development, or institutional facilities that otherwise might choose locations near Stockton or Sacramento or in Southern California. The net addition to regional employment represented by only a few businesses would be small. (See Implications for Citywide and Regional Growth and Development Patterns, in VI.B., p. VI.B.119, for more detailed discussion.)

Net Addition of Housing and Population

The citywide scenarios show housing and population growth with all Alternatives. There would be more growth in the scenarios for Alternatives A and B than there would be in the scenario for Alternative N, since the latter results in no new housing development in the Project Area. (There would be somewhat more housing development outside the Project Area with Alternative N--primarily in small infill projects--but the number of additional units would be small relative to the large number of units in the Project Area under Alternatives A or B.) Chapter VII. Variations on Alternatives, p. VII.1, discusses a housing variant of Alternative N.

The citywide housing and population scenarios illustrate the contribution each Alternative would make (see Table VI.C.11, p. VI.C.47). Alternative B, with the most Project Area housing, would result in 8,800 more housing units in the City at build-out than would Alternative N. In other words, compared to Alternative N, Alternative B would result in a net addition of 8,800 units, or 30% more housing growth in the City. Alternative A would result in 6,400 more housing units in the City at build-out (about 22% more housing growth) than would Alternative N. The net addition with Alternative B would be greater than that with Alternative A.

The choice between Alternatives makes proportionally more difference for the net addition of housing in the City than it does for the net addition of employment. Where Alternative B (most total housing / population) would represent an addition of about 30% more housing in the City compared to Alternative N (least total housing / population), Alternative A (most total employment) would represent an addition of 5% more jobs in the City compared to Alternative B (least total employment).

The reason for the difference between housing and employment in terms of net addition to the City is that there are more location options in San Francisco for businesses and commercial development than there are for residential development. That conclusion is based on current plans, policies and zoning as set forth in the Commerce and Industry and Residence Elements of the San Francisco Master Plan, as well as special area plans. Under current zoning, the capacity of the City's land to accommodate commercial development is much greater than its capacity to accommodate residential development. Thus, opportunities for business expansion and employment growth in the City, but outside the Project Area, are greater than opportunities for housing development. Consequently, through the analysis period, Mission Bay Alternatives that re-zone the Project Area for a substantial amount of residential development (Alternatives A and B) would contribute relatively more to the net addition of housing / population in the City than Alternatives with the largest amounts of commercial development in the Project Area would contribute to the net addition of business activity / employment in San Francisco.

For some time into the future, there would not be much difference between the scenarios for each Mission Bay Alternative in terms of a net addition of housing and population in the region. There are a variety of location options elsewhere in the region for residential development. Consequently, the choice between Mission Bay Alternatives would affect the distribution of housing / population growth within the region, but not the amount of growth.

From a longer-term perspective, however, there could be differences between the regional scenarios for each Alternative. When considered in terms of the capacity of the region's land to accommodate residential development as prescribed by local zoning policy, Mission Bay Alternatives that re-zoned industrially zoned land for housing would expand the overall capacity for residential development in the region. Thus, over the longer term, assuming all other factors to be equal, Alternatives A and B would result in a net addition to the region's housing supply (i.e., adding housing that otherwise could not be built in the region) compared to Alternative N. The net addition would be greater with Alternative B than with Alternative A.

RELATIONSHIP BETWEEN EMPLOYMENT GROWTH AND POPULATION

Employment growth can induce population growth, thereby stimulating housing demand and demand for community facilities and infrastructure. Increases in employment require workers to fill the new jobs. The additional workers come from several sources: new residents in the area, people joining the labor force (e.g., having finished school, deciding to return to work or taking a job for the first time) and unemployed people finding jobs. The first source mentioned (new residents in the area) represents the population growth "induced" by employment growth.

For comparing the Mission Bay Alternatives from the perspective of population growth inducement, it is necessary first to determine net additional employment growth associated with each Alternative. If the employment growth is not dependent on Mission Bay development, i.e., if it would occur elsewhere in the City or region if not in Mission Bay, then population growth associated with that employment growth cannot be attributed solely to Mission Bay development. This leads to analysis of the cumulative scenarios for each Alternative, since they reflect overall patterns of employment growth. Those scenarios can be used to identify the net gain in employment associated with one Alternative compared to another.

As described above, p. VI.O.3, the Alternatives would make little difference in total regional employment. The amount of employment growth in the Bay Area through build-out/2020 would be essentially the same in the scenarios for each Alternative. Therefore, from the cumulative perspective, it can be concluded that the choice of one Mission Bay Alternative over another would not result in more or less growth-induced population attributable to employment growth. In other words, employment growth in the scenarios for all Alternatives would induce about the same amount of population growth.

The second growth-inducement consideration is locational. There would be differences between the scenarios in the locations of employment growth throughout the region. Those differences would lead to different locational implications for induced population growth (and associated housing demand and other public service and infrastructure requirements).

The differences between the scenarios for each Alternative in terms of regional employment growth and development patterns are described in VI.B. Land Use, Business Activity, and Employment, pp. VI.B.119-VI.B.123. Alternative A would concentrate the most business activity and employment in San Francisco. By comparison to the other Alternatives, less of total expected regional employment growth would occur in parts of the region outside San Francisco. The scenario for Alternative B represents the other extreme. Without much commercial / industrial development in the Project Area, some expected business activity and employment would locate elsewhere in San Francisco; other activity and employment would locate in other parts of the region outside the City. Regional economic activity would be most dispersed in the scenario for Alternative B, compared to the scenarios for the other Alternatives. The scenario for Alternative N falls in between those extremes: business activity and employment growth would be more dispersed than in the scenario for Alternative A and less dispersed than in the scenario for Alternative B.

Those different patterns for the location of business activity and employment growth throughout the region have implications for induced population growth. Although the amount of population growth induced by employment growth would not differ between the scenarios, the locations of where that population growth and associated impacts would occur would vary. Generally, following the discussion in VI.B. (summarized above), Alternative A would result in relatively more induced population growth and associated housing and other service demands centered on San Francisco and relatively less in the rest of the region, compared to the other Alternatives. Alternative B would result in more induced growth and impacts dispersed throughout the region and less in San Francisco. Alternative N would result in more induced effects in the City than would Alternative B and more induced effects in the rest of the region than would Alternative A.

As in the case of multiplier effects, population growth-inducing effects are accounted for in the cumulative scenarios of employment and population used in the EIR. The economic forecasts rely on population growth and labor force growth to sustain employment growth.

MULTIPLIER EFFECTS

Multiplier effects account for those economic inter-relationships through which businesses of certain types support other businesses, business activity supports household spending, and household spending generates sales and economic activity. Future economic activity in Mission Bay under all Alternatives would be related to economic activity elsewhere in the City and the region. Some Mission Bay activity would have multiplier effects, supporting businesses outside the Project Area. Project Area businesses would provide sales and support employment growth in other businesses located elsewhere in the Downtown & Vicinity, in areas west and south of the Project Area and outside the City, through purchases of supplies, services, or equipment. Project Area and related business activity would provide wages and salaries that support household spending for consumer goods and services.

Conversely, some economic activity in Mission Bay would be supported by the multiplier effect of businesses located outside the Project Area. For example, downtown offices or hotels could be customers of businesses likely to locate in the Project Area. Thus, not all Mission Bay commercial and industrial development would generate economic activity through multiplier effects. Some would accommodate multiplier activity generated from other locations. That conclusion would hold for all Alternatives.

There would be differences between Alternatives in the magnitude of multiplier effects associated with economic activity in the Project Area. Alternative A would generate the most, followed by Alternative N, then Alternative B.

Retail activity in the City will be affected by the spending of Project Area residents and workers. This is one aspect of the multiplier effects described above. Mission Bay development would contribute to growth and change in the City's retail sector in two ways. First, retail development in the Project Area would be supported by Project Area residents and workers and also would expand shopping and restaurant opportunities for those living and working outside Mission Bay. Estimates are provided on pp. VI.B.104-VI.B.106 of the amount of retail space that could be supported by spending by Project Area residents and workers for each Alternative. The analysis compares those amounts to the amount of retail space included in each Alternative for conclusions about the extent to which Project Area retail space would depend on spending from a larger market area. Second, retail spending outside Mission Bay by Project Area residents and workers would support sales growth in stores, restaurants, and specialized shopping areas elsewhere in the City. The effects of retail spending from Project Area residents and workers on nearby retail areas and in other parts of the City are described on p. VI.B.118.

The economic forecasting analysis for the Mission Bay EIR considered all the inter-relationships described above. The forecasts of employment for the Downtown & Vicinity, the total City and the region account for employment attributable to the multiplier effects of Project Area activity. Consequently, the cumulative impact analyses in the EIR account for any additional growth outside the Project Area that could be considered to be generated by Project Area activity.

SPILLOVER EFFECTS IN NEARBY AREAS

Spillover effects are the changes in economic activity in areas near Mission Bay that would result from the amount and type of Project Area development. Development of each Alternative would upgrade the land use character and types of activities in the Project Area, and would mean major changes in character in Alternatives A and B with substantial amounts of housing. Alternatives A and N would add substantially to business activity and employment in the southeastern part of the City. Alternatives A and B would result in improved transportation access to jobs in the Downtown & Vicinity for residents of the southeastern part of the City. Over time, Mission Bay development and associated infrastructure and public service improvements would affect the land use and residential character, as well as economic activity, in areas beyond Project Area boundaries.

Those areas (South of Market, Showplace Square, North Potrero, Potrero Hill, Lower Potrero, Central Bayfront, Inner Mission, and South Bayshore) are expected to change over time in any case. Development of Mission Bay would affect the pace of that change, and there would be differences between the scenarios for each Alternative in terms of the types of changes that would occur. Discussions under the heading Implications for Nearby Areas in VI.B. Land Use, Business Activity, and Employment, p. VI.B.106, and VI.C. Housing and Population, p. VI.C.86, describe the spillover effects of Mission Bay development and compare the changes expected in other areas as a result of activity in the Project Area with each Alternative. The issues and conclusions are summarized below.

In terms of business activity and employment, with all Alternatives, Mission Bay's upgrading of the type of space and type of activity in the Project Area gradually would increase the attractiveness of areas nearby, and they would become more desirable locations for a broader range of business activities. There would be differences between the Alternatives in land use change and employment growth in Nearby Areas, however, depending on the extent to which Project Area development would accommodate various demand groups. Since Alternative B would accommodate the smallest amount of commercial development and employment growth in the Project Area, it would result in the most demand for space over time in Nearby Areas. Compared to the other Alternatives, with Alternative B there would be more competition for space, more new development, pressure to increase commercial rents, and more changes for existing businesses in those areas. Generally, differences between Alternatives in Mission Bay office development would result in more or less effects on parts of the Downtown & Vicinity north of the Project Area, while differences in S/LI/RD or new M-2 Industrial development would result in more or less effects on Nearby Areas to the west and south.

In some instances, the location of new development in the Project Area would raise the issue of compatibility with adjacent development. For example, Mission Bay residential development east of Third Street (in Alternatives A and B) could conflict with potential container terminal development at Mission Rock / Pier 50 and with active maritime uses on piers east of the Project Area. The character of the South of Market area along Townsend Street would not be the same with Alternative A (Mission Bay office across Townsend Street) as it would with Alternative B (Mission Bay housing across Townsend Street).

In terms of housing and population, upgrading of the Project Area would have some spillover effects in Nearby Areas. The new Mission Bay residential neighborhood in Alternatives A and B would represent a dramatic change in land use in that part of the City. The result could be relatively more people attracted to the existing residential areas nearby than otherwise. On the other hand, large amounts of Mission Bay housing could absorb some of the demand for housing in San Francisco that otherwise would result in more demand for existing housing in Nearby Areas. Alternatives with large amounts of commercial development and employment in the Project Area (Alternative A and, to a lesser extent, Alternative N) would bring business activity that much closer to residential neighborhoods in the southeastern part of the City. That could translate into improved job opportunities and access to jobs for area residents. It also could result in more new residents and gentrification pressures. Those spillover effects would be more evident in adjacent Nearby Areas than they would be in more-distant areas. In the end, it is difficult to predict the direction of spillover effects from the housing / population perspective because features of each Alternative have implications that offset each other.

VII.

This
Envi
of ea

Six
The
Alte
in
3) re
7,70
busi
spac
for s

Fou
asse
allo
the
"aff
leve
larg
of r
Alte

1.

The
pre
such
dev
this
bloc
(91

VII. VARIATIONS ON ALTERNATIVES

This chapter considers ten variations on the EIR Alternatives analyzed in Chapter VI. Environmental Setting, Impact and Mitigation. The discussion focuses on how the impacts of each variant would differ from those of the parent Alternatives.

Six variants on the land use programs and densities of the Alternatives are considered. The land use variants are: 1) adding 1,000 units of housing south of China Basin Channel to Alternative N; 2) replacing residential, open space and S/LI/RD uses east of Third Street in Alternative B with Port-Related/M-2 uses similar to those in Alternative N; 3) reducing housing density throughout the Project Area in Alternative B from 10,000 to 7,700 units; 4) replacing some S/LI/RD space in Alternative A with retail and personal and business services space, and increasing community facilities; 5) replacing some S/LI/RD space with office space in Alternative A; and 6) allowing an increase in height to 220 feet for some residential structures along Fifth Street in Alternative B.

Four other variants are also considered: 7) "Office as a Primary Use in S/LI/RD Space" assesses the implications of changing the S/LI/RD designation in Alternatives A and B to allow office as a primary use; 8) "Variations in the Percentage of Affordable Housing and the Size of Affordable Units" addresses the implications of varying the percentage of "affordable" housing developed in the Project Area in Alternatives A and B from the 30% level identified in the Mayor's Letter and also addresses the implications of building more larger units and fewer smaller units; 9) "CalTrain Station Location" discusses the effects of not relocating the CalTrain station to Seventh and Channel Streets as is proposed in Alternatives A and B; and 10) Reduced Seismic Hazard for Alternatives A, B, and N.

1. HOUSING DEVELOPMENT (ALTERNATIVE N)

The Central Waterfront Plan calls for development of a mixed-use neighborhood with predominantly residential uses south of the channel west of Third Street. In the future, such housing could occur in the Project Area similar to the almost 400 units that have developed in the formerly industrial Northeastern Waterfront. As shown in Figure VII.1, this variant would add approximately 1,000 housing units to Alternative N in several blocks south of the channel between Fourth and Sixth Streets. This housing would be MDR (910 units) and LDR (90 units), allowable as a Conditional Use under existing M-2 (Heavy

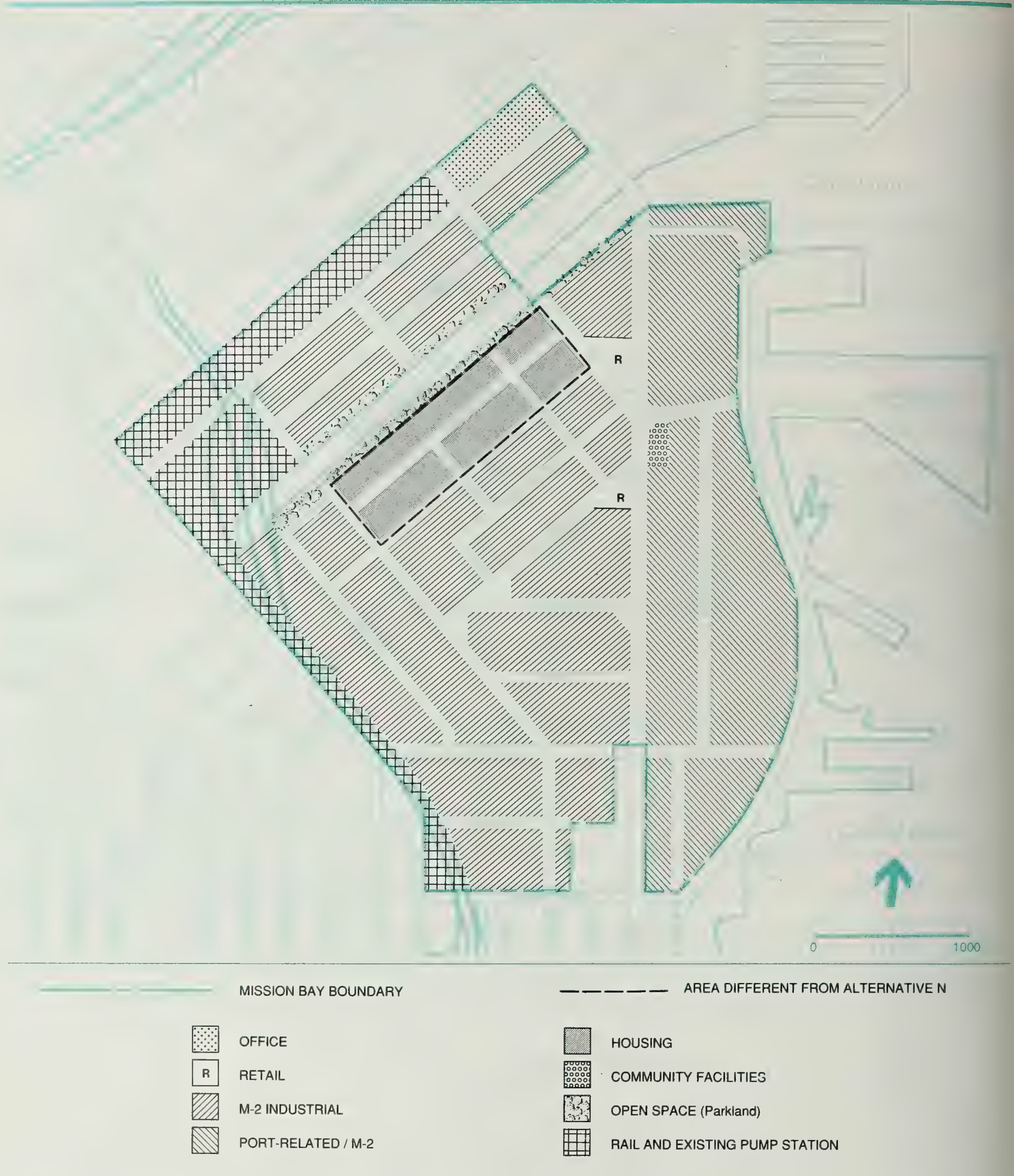

R
R
0
1000
MISSION BAY BOUNDARY
AREA DIFFERENT FROM ALTERNATIVE N
OFFICE
R
RETAIL
M-2 INDUSTRIAL
PORT-RELATED / M-2
HOUSING
COMMUNITY FACILITIES
OPEN SPACE (Parkland)
RAIL AND EXISTING PUMP STATION

FIGURE VII.1
HOUSING DEVELOPMENT (ALTERNATIVE N)

SOURCE: Environmental Science Associates, Inc.

Industrial) zoning. Allowing for a 3.5% residential vacancy, this would add about 1,975 Project Area residents to the houseboat residents under Alternative N, for a total of about 2,010 persons.

The housing would occupy about 16.7 acres that would otherwise be used for about 725,000 square feet of M-2 space under Alternative N. For purposes of a conservative analysis of this variant, it is assumed that that amount of M-2 floor area would be built elsewhere within the Project Area (rather than being displaced) by developing the remaining M-2 Industrial blocks to greater density. Such an increase in density could be accommodated within the height and bulk assumptions developed for Alternative N./1/

PUBLIC PLANS, POLICIES AND PERMITS

The addition of housing to Alternative N would address Central Waterfront Plan objectives for the China Basin Subarea to promote new housing south of China Basin Channel (see Table VI.A.1, Residence Objective, p. VI.A.36, and China Basin Subarea Objective 3, Policy 2, p. VI.A.38). As with Alternative N, this variant would have some retail uses and community facilities that could serve the resident population and office and other non-industrial employment. By providing new housing, the variant would have a more diverse land use mix than Alternative N, but it would not fully respond to Central Waterfront Plan policies to create a mixed-use neighborhood on all surplus rail lands west of Third Street.

LAND USE, BUSINESS ACTIVITY, AND EMPLOYMENT

Among the EIR Alternatives, Alternative N would provide space in Mission Bay suitable for businesses similar to existing Project Area operations (see p. VI.B.82). The addition of housing in several blocks south of the channel would alter the function and character of those blocks. Additional Project Area residents would provide more support for local retail stores adjacent to or within the housing area. Alternative N would orient retail uses toward Third Street, serving the eating, drinking, and convenience shopping needs of workers, as well as providing sites suitable for larger-scale stores serving a larger market. This variant would include some smaller-scale residential-serving retail uses as well. No increase in total retail space is assumed.

Employment in the Project Area would be the same as for Alternative N, assuming the M-2 space displaced for housing would be built elsewhere in the Project Area (see

Table V.6, p. V.35), except for an increase of about 40 jobs associated with management, security and maintenance of the housing. Construction employment also would be higher than in Alternative N due to housing construction.

Introduction of housing into an industrial area could pose some land use conflicts with surrounding industrial uses depending on the types of activities occurring there; certain types of manufacturing operations or businesses involving nighttime operations or use of hazardous materials, for example, would not be compatible with housing.

The presence of housing could affect the types of uses that choose to locate in Mission Bay in the future. For example, housing uses would tend to make the area more attractive to small-scale office and retail uses than to industrial and distribution uses like those currently in the area.

HOUSING AND POPULATION

While Alternative N would make no contribution to expanding the City's supply of housing (see p. VI.C.67), this variant would add 1,000 housing units to that supply, helping to offset some of the demand for housing associated with Project Area employment growth. Total housing provided would be about 13% of the total in Alternative A and about 10% of the total in Alternative B, so less diversity in terms of household sizes, types and incomes would be expected (see p. VI.C.64).

For office development in Alternative N, the City's OAHPP would require either payment of an in-lieu fee for production of housing or construction of about 580 housing units, about 360 to be affordable to households of moderate or low income (see Table VI.C.19, p. VI.C.73). This variant could enable the developer of the office block to satisfy the OAHPP requirement in the Project Area (assuming the office developer could secure development rights to that land). Overall employment growth in the Project Area would increase demand for housing in San Francisco. Housing sufficient to accommodate the increase in San Francisco households with Project Area workers in Alternative N would require about 2,100 housing units (see Table VI.C.20, p. VI.C.78), about 1,670 of which should be units priced at affordable levels (see Table VI.C.21, p. VI.C.79). The 1,000 units provided by this variant would supply about half that total demand.

COMMUNITY SERVICES AND INFRASTRUCTURE

The residential population in this variant would increase community services needs above those in Alternative N. Fire incidents and service hours would be about 60% higher than in Alternative N, while good intent and rescue calls would be about 65% higher. Neither Alternative N nor the variant would require an additional engine or truck company.

Police incidents would be about 50% higher than in Alternative N. Due to the addition of residential uses, the nature of crimes in the Project Area would include more assaults and domestic violence. While about nine more patrol officers would be needed to maintain existing service levels in Alternative N at build-out (see Table VI.D.5, p. VI.D.44), about 12 more would be needed with this variant. Investigative and other personnel requirements would be the same as for Alternative N.

There would be no impact on the San Francisco Unified School District (SFUSD) in Alternative N (see p. VI.D.54). Under this variant, however, if the composition of the residential population were similar to that in Alternatives A and B, it would include about 225 public school students (95 in grades kindergarten-5; 55 in grades 6-8; and 75 in grades 9-12). About four elementary, two middle and three high school classrooms would be required and about 14 teachers would be needed. As with Alternatives A and B, by the year 2000 existing schools would not have sufficient space to accommodate any of the Project Area students under this variant of Alternative N.

The residents in this variant would require about ten acres of parkland; this need would not be met by the 5.2 acres to be provided along the channel (see Figure VI.D.8, p. VI.D.64). This variant also would not fully serve recreation needs because it would not provide recreation buildings or active recreation areas suitable for field and court sports.

Demand for library services would increase, but residents would use the Potrero Branch, Main Branch or other San Francisco branch libraries (see p. VI.D.93). City responses to ambulance calls would be about 140 calls per year more than in Alternative N (see Table VI.D.21, p. VI.D.99). Those calls and other DPH services would be handled by existing department resources (see Public Health, p. VI.D.100). Water demand and sewage generation would be about 25% higher than in Alternative N, but would be accommodated within the capacities of existing systems (see Water Supply, p. VI.D.103, and Sewers and Wastewater Treatment, p. VI.D.107). Solid waste generated would be about 23% greater than under Alternative N; that would still represent about 2% of total San Francisco solid waste generation (see p. VI.D.111). Effects on streets would not differ from those discussed for Alternative N (see p. VI.D.114).

TRANSPORTATION

The addition of 1,000 residential units (adding about 1,975 residents) would increase travel demand originating in the Project Area under Alternative N by about 5%. At build-out, about 5,700 more daily vehicle trips would be generated than with Alternative N. The 40 housing-related jobs that would be created would increase travel demand attracted to Mission Bay very slightly. The effect of the total increase on projected cumulative highway vehicle volumes and transit riders would be statistically insignificant (about 5% more total trips and 4% more peak-hour trips than Alternative N). The inclusion of additional housing within the Project Area, however, would have the beneficial effect of increasing commute trips that remain within the Downtown & Vicinity, thus decreasing commute trips that would cross MUNI or regional screenlines.

Cumulative transportation analysis of Alternative A, B, and N showed that there are few substantial differences in impacts among the Alternatives./2/ The numerical differences in travel demand among Alternatives A, B, and N are greater than those between Alternative N and this variant. Therefore, transportation impacts under this variant would not be statistically different. Significant cumulative transportation impacts, identified under Alternatives A, B, and N, however, would continue to occur under this variant.

AIR QUALITY

Additional motor vehicle trips would result in a net increase in vehicular emissions for the Project Area that would be about 6% greater than that estimated for Alternative N (see Table VI.F.3, p. VI.F.14). The difference between this variant and Alternative N would not be significant with respect to potential local and regional air quality effects. That is, no excesses of CO standards would occur within the Project Area, but emissions would be significant on a County-wide basis. For this variant, total vehicular emissions would be about 80% of the emissions estimated to occur under Alternative A and about 120% of those under Alternative B. Like Alternative N, this variant would not be entirely consistent with the goals and recommendations of the Air Quality Plan, but by including residential development near an employment center, this variant would reduce the vehicle miles traveled for commuting by these future residents, which is one of the long-term goals of the Plan. However, this variant would also allow for more intensive development of the Project Area than would occur under Alternative N which already exceeded projections assumed for demonstration of attainment in the Plan.

NOISE

Increased evening rush-hour motor-vehicle traffic in this variant would increase traffic noise levels above those estimated for Alternative N (see p. VI.G.23). An increase of about 4% over Project Area peak-hour traffic volumes for Alternative N would be produced by this variant. If the percentage increase were to affect all Project Area streets, the largest increase in automobile traffic would be along I-280 where about 270 more automobiles would travel. Traffic volume increases of 4% would increase noise levels by less than one dBA, L_{eq}, over Alternative N levels, which would not be a noticeable difference. The addition of housing would introduce new noise-sensitive land uses into an industrial area with potentially high noise levels from truck traffic (see p. VI.G.23) and industrial/commercial processes (see p. VI.G.27). Compared to other locations within the Project Area, the lowest traffic noise levels would occur south of the channel between Fourth and Sixth Streets (see p. VI.G.24), the area proposed for the housing in this variant. Industrial / commercial process noise could be generated by businesses anywhere in the surrounding M-2 Industrial space, resulting in increases in intrusive noise in the housing area. Exterior noise levels at the housing development could reach 64 dBA, L_{eq}. Pursuant to Title 24 noise insulation standards, acoustical analyses would be required prior to construction of the housing to demonstrate that interior noise levels would be less than 45 dBA, CNEL (see p. VI.G.28).

ENERGY

Total annual operational energy consumption would increase by about 7% above the levels estimated for Alternative N (see Table VI.H.2, p. VI.H.13). Electricity consumption would be about 3% higher and natural gas consumption would be about 26% higher. As with the EIR Alternatives, Project Area energy consumption would add incrementally to PG&E's total system load, but would have little effect on PG&E's capacity (see p. VI.H.15). Construction energy would be about 7% more than that estimated for Alternative N. Transportation energy consumption would be about 5% higher (see p. VI.H.8 and p. VI.H.19).

ARCHITECTURAL RESOURCES AND URBAN DESIGN

In Alternative N west of Third Street, new M-2 Industrial buildings would be expected to vary in height from one to four stories, with heights generally up to 40 feet. Buildings of that height would be up to as high as the 40-foot line on Figure VI.I.5, pp. VI.I.28-VI.I.29, and would not obscure views from Potrero Hill of the Bay. The MDR units south of the channel west of Third Street in this variant would be about 20 feet higher than the M-2 uses in Alternative N. Therefore, they could obscure views from Potrero Hill of the Third and Fourth Street bridges, China Basin Channel, and part of the China Basin Building. However, they would not obscure views of downtown, the Bay Bridge, or East Bay shoreline.

In general, the residential buildings would provide more diversity of building design in the area south of the channel between Fourth and Sixth Streets than would occur in Alternative N. The street-level character of the blocks along Channel, Hooper, Irwin, Fourth and Sixth Streets would be one of a medium-density residential neighborhood in this variant instead of an industrial area as under Alternative N. For example, the view of China Basin Channel near Fourth Street would differ from that in Alternative N (see Figure VI.I.8, pp. VI.I.46-VI.I.47) because four-to six-story housing would abut the south side of the channel in this variant instead of the two-story M-2 Industrial uses in Alternative N. The scale of MDR would be similar to that shown in Figure VI.I.10, pp. VI.I.52-VI.I.53, for Alternative A (Viewpoint 5). As with Alternative N, MDR buildings in this variant would shade open space south of China Basin Channel in mornings and at mid-day.

GEOLOGY AND SEISMICITY

Geology and Seismicity impacts would be similar to those assessed for Alternative N (see pp. VI.K.23-VI.K.32), except that the approximately 1,975 additional Project Area residents in this variant would represent an increase in the size of the Project Area population that could be affected in the event of a major nighttime earthquake (see p. VI.K.43). All buildings over five stories in height would require pile-supported foundations.

HAZARDOUS WASTES

Housing proposed in this variant could expose additional residents to potential hazards from site clean-up activities or undetected contamination. As with Alternative N, site investigations and hazardous materials clean-up would occur on a parcel-by-parcel basis as developments are proposed (see VI.N. Hazardous Wastes, p. VI.N.27). There would be no overall mitigation program as there would for Alternatives A and B, which embody integrated development plans.

GROWTH INDUCEMENT

The development of housing in the Project Area under this variant would result in more total housing and population in San Francisco than expected under Alternative N. There also might be somewhat less infill housing development in other parts of the City than expected under Alternative N which has no housing in the Project Area. In particular, this variant could result in somewhat less housing demand in nearby residential areas than would be expected with Alternative N. Other aspects of growth inducement for this variant would be the same as those described for Alternative N on pp. VI.O.1-VI.O.9.

OTHER TOPICS

Other environmental effects of this variant not discussed above would be essentially the same as those in Alternative N (see VI.J. Cultural Resources, p. VI.J.21; VI.L. Hydrology and Water Quality, pp. VI.L.14, VI.L.18, VI.L.22, VI.L.29; and VI.M. Vegetation and Wildlife, p. VI.M.13).

MITIGATION

The same mitigation measures would apply to this variant as would apply to Alternatives A and B for housing-related issues and Alternative N for other uses (see Mitigation sections in Chapter VI.). As discussed above, the housing in this variant could enable the developer of the office blocks to satisfy the City's OAHPP requirement on-site. In addition to Alternative N and housing-related mitigation measures, the following would apply:

- The SFUSD could expand existing schools (e.g., by using temporary classrooms) to accommodate the approximately 225 Project Area public school students generated by this variant.

- To meet the recreation needs of Project Area residents, about five more acres of open space and active open space areas and facilities could be provided in addition to passive open space along the channel.

- Pursuant to Title 24 noise insulation standards, acoustical analyses would be required prior to construction of housing to demonstrate that interior noise levels would be less than 45 dBA, CNEL.

2. PORT-PRIORITY RETENTION (ALTERNATIVE B)

This variant of Alternative B would replace Alternative B housing, open space, wetlands and S/LI/RD uses east of Third Street with Port-Related/M-2 uses (see Figure VII.2). Such Port-Related uses are called for under a variety of public plans, as discussed below. Those Port-Related/M-2 uses would be similar to the uses projected for east of Third Street under Alternative N and would be consistent with Central Waterfront Plan, BCDC and Port designation of the area for Port Priority Use. As under Alternative N, about one million square feet of building space and 1.8 million square feet of land would be used for Port-Related/M-2 activities east of Third Street.

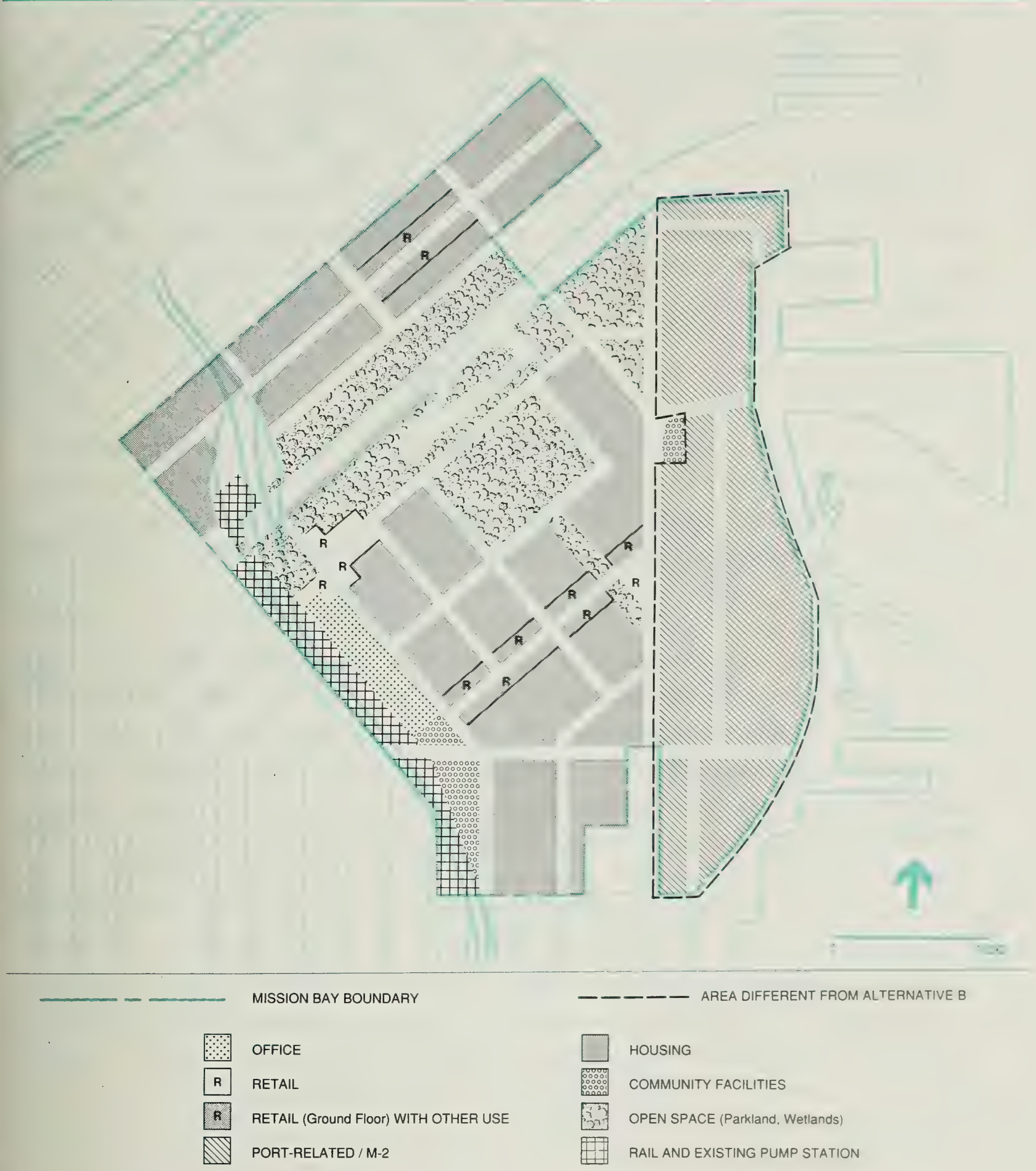
To accommodate Port-Related uses, this variant would eliminate the following Alternative B uses east of Third Street:

- 2,320 units of MDR, reducing the total number of units to 7,680, and reducing total residential population at build-out by about 4,410 persons, from 18,670 to 14,260. Housing-related employment would be about 90 employees less than under Alternative B;
- 20.6 acres of wetlands (the 13.6-acre wetlands at China Basin and the 7.0-acre wetlands between Piers 54 and 64);
- 9.1 acres of parkland, and 2.5 acres of publicly accessible open space associated with the removed housing and S/LI/RD uses;
- 420,000 square feet of S/LI/RD space (all in Alternative B), reducing employment by 900 employees; and
- 1.8 acres of community facilities, reducing employment by about 120 employees. (The 0.8-acre Fire Station 30 site would be retained.)

Compared to Alternative B, total employment for this variant would be increased by about 1,145 Port-Related/M-2 employees and decreased by about 1,120 housing-related, S/LI/RD, parks, open space, and community facilities employees. The net result would be an increase of about 25 employees.

PUBLIC PLANS, POLICIES, AND PERMITS

Alternatives A and B would not respond to the Central Waterfront Plan's overall objective to expand maritime and industrial activity east of Third Street (see p. VI.A.34), the Seaport Plan's designation of Piers 52 to 64 as a near-term container terminal site and the area east of Third Street as a Port Priority Use area (see pp. VI.A.55-VI.A.56), or BCDC Bay Plan and San Francisco Waterfront Special Area Plan designation of the area east of Third Street as Port Priority Use (see pp. VI.A.58-VI.A.59). By comparison, this


R
R
R
R
R
R
R
R
R
R
R
R
R
MISSION BAY BOUNDARY
AREA DIFFERENT FROM ALTERNATIVE B
OFFICE
R RETAIL
R RETAIL (Ground Floor) WITH OTHER USE
PORT-RELATED / M-2
HOUSING
COMMUNITY FACILITIES
OPEN SPACE (Parkland, Wetlands)
RAIL AND EXISTING PUMP STATION

Mission Bay

FIGURE VII.2
PORT-PRIORITY RETENTION (ALTERNATIVE B)

SOURCE: Environmental Science Associates, Inc.

variant would respond to those plans and policies by reserving the Project Area east of Third Street for Port Priority uses. That reserved area would provide the backland needed to potentially develop a container terminal at Mission Rock / Pier 50 in the longer-term future. A land exchange to acquire property for transfer of the near-term container terminal development site designation from Piers 52 to 64 to Piers 70 to 80 (see IV. Study Approach and Organization, p. IV.2) would not be necessary. Amendments to the above-referenced plans that would be required for Alternatives A and B would not be needed in this variant.

LAND USE, BUSINESS ACTIVITY, AND EMPLOYMENT

As noted above under Public Plans, Policies and Permits, this variant would reserve the area east of Third Street as a "Port-Priority" area that could accommodate businesses similar to the existing maritime-related businesses. Thus, there would be less transition in that area than otherwise would occur in Alternative B.

The number and types of jobs in the Port-Related/M-2 space would be similar to those estimated for that use in Alternative N (see Table V.6, p. V.35). While this variant would result in about 1,145 Port-Related/M-2 jobs, these jobs would take the place of about 900 S/LI/RD, 90 housing-related and 125 community facilities and open space jobs estimated for Alternative B east of Third Street. There would be about 25 more jobs than under Alternative B (a difference of less than 1%). With this variant, there would be more crafts, operatives, and other jobs in the Project Area, and fewer professional, technical, managerial, and clerical jobs than there would be in Alternative B without port-priority retention east of Third Street.

Alternative B would preclude future container terminal development at Mission Rock/Pier 50 because non-maritime uses would occupy the land that would be necessary as backland for such a terminal (see p. VI.B.102). By comparison, this variant would reserve the entire area east of Third Street for potential container terminal development in the longer term future (beyond the time horizon for build-out in the EIR). The effects on maritime-related uses in the Project Area of reserving that land would be similar to those discussed for Alternative N (see p. VI.B.103). Effects on the piers adjacent to Mission Bay also would differ from those in Alternative B. In Alternative B, development of residential uses could result in potential land use conflicts and incompatibility with maritime activity on adjacent piers. Eventually the level of maritime activity on the piers could decline (see p. VI.B.117). In this variant, those land use conflicts and compatibility issues would not exist and maritime-related activity could continue on the piers adjacent to Mission Bay. As in Alternative N, the level of maritime activity on those piers would remain low unless the area were developed as a container terminal (see Alternative N discussion on p. VI.B.117).

This variant could pose land use compatibility problems (such as noise) between industrial uses east of Third Street and residential uses on the west side of Third Street. Over the long-term future when the residential neighborhood is established, it could be extremely difficult to develop a container terminal across the street. An active terminal could pose greater land use conflicts than the smaller-scale maritime-related and industrial activity otherwise in this area under this variant.

HOUSING AND POPULATION

This variant would reduce Alternative B's contribution to the City's housing supply by 2,320 housing units (about 23% fewer) to 7,680 units, similar to the total number of units in Alternative A. Compared with Alternative B, this variant would have about 4,410 fewer people living in Mission Bay. However, the characteristics of the remaining Mission Bay population would be the same as those described for Alternative B (see p. VI.C.64). The number of residents would be about 160 less than in Alternative A.

There would be about 700 fewer affordable units than in Alternative B; the remaining total units (7,680) and affordable units (about 2,300, or 30% of the total) would more than satisfy the City's OAHPP requirement for Alternative B (see Table VI.C.19, p. VI.C.73). Considering all employment growth in this variant, the 7,680 housing units built in the Project Area would still exceed by a large amount the number of units needed to accommodate additional San Francisco households with Project Area workers (as would be the case under Alternative B; see Table VI.C.20, p. VI.C.78). The estimated number of units to accommodate such households under this variant (about 725) would represent about 9% of the new housing units to be built in the Project Area. The remainder (about 6,950) would represent housing available to accommodate other demand besides that associated with Project Area employment growth, about 25% less than the amount of such housing in Alternative B.

COMMUNITY SERVICES AND INFRASTRUCTURE

The Port-Related uses would reduce the demand for most community services below levels in Alternative B. The variant would have about 25% fewer fire incidents per year.

The proportion of good intent and rescue calls, which require less time per call than do other types of incidents, would be lower and service hours would therefore be about 20% lower. Thus, while Alternative B at build-out would require a truck company in addition to an engine company needed by the year 2000 (see p. VI.D.41), that truck company would not be required in this variant.

Police incidents would be about 25% lower than in Alternative B and the nature of crimes would shift to proportionally more theft and fewer assaults and incidents of domestic violence. About 65 instead of 90 additional patrol and other police personnel would be required at build-out to maintain current levels of service (see Table V.D.5, p. VI.D.44).

The Project Area population in this variant would include about 500 (27%) fewer public school students in grades kindergarten through 12 than the approximately 1,870 estimated in Alternative B (see Table VI.D.9, p. VI.D.57). The variant would require about 50 classrooms and 115 teachers, about 18 fewer classrooms and 30 fewer teachers (see Table VI.D.10, p. VI.D.58). Student population and need for classrooms and teachers would be about the same as for Alternative A.

Replacing 9.1 acres of parkland, 20.6 acres of wetlands, and 2.5 acres of open space associated with other uses would reduce total open space in Alternative B by about 32% from 99.4 acres to 67.2 total acres of open space. The remaining 52 acres of parks and wetlands would not satisfy the 14,260 residents' demand for about 72 acres of neighborhood and district open space, similar to the open space requirements for residents for Alternative A. Open space and recreation personnel requirements associated with parkland would be about 20% lower than in Alternative B (see Table VI.D.17, p. VI.D.80).

The 13.6-acre wetlands at China Basin (OS-7) and 7-acre wetlands between Piers 54 and 64 (OS-11) in Alternative B would provide a visual, educational and recreation resource for Project Area residents and employees, other residents of the City and visitors from outside San Francisco (see p. VI.D.85). Although the 13.2-acre mid-channel wetlands (OS-2) would remain in this variant, forgoing development of those two wetlands would reduce the regional attractiveness of the area to wetlands visitors. The reduction in total open space in this variant also would reduce Alternative B open space benefits to Nearby Areas (see p. VI.D.85).

Demand for library services would be lower than in Alternative B (see p. VI.D.93). City responses to ambulance calls would be about 1,000 calls per year, or about 10% fewer than in Alternative B. That number of calls would represent about one-third of a full-time paramedic's time (see Table VI.D.21, p. VI.D.99). This service demand would be similar to that for Alternative A. Water demand and sewage generation would be about 20% lower than in Alternative B and about 35% less than Alternative A (see Water Supply, Table VI.D.22, p. VI.D.101, and Sewers and Wastewater Treatment, Table VI.D.23, p. VI.D.104). About 18% less solid waste would be generated than in Alternative B (see Table VI.D.24, p. VI.D.109). As in Alternative N, Port-Priority/M-2 uses east of Third Street would generate more truck traffic than in Alternative B. That may generate greater maintenance requirements for off-site streets (see p. VI.D.114).

TRANSPORTATION

This variant would have 4,410 fewer residents than would Alternative B, resulting in a 23% lower travel demand originating in the Project Area than Alternative B. The increase of about 25 employees projected by the trade-off between Port-Related/M-2 jobs and jobs associated with S/LI/RD, housing, open space and community facilities would generate a 0.5% increase in peak travel demand attracted to Mission Bay.

The net change in total travel demand generated by this variant would be about 18% below that forecast for Alternative B. This decrease would not significantly change projections of either cumulative screenline travel demand or intersection levels of service. The reduction in number of housing units within the Project Area, however, would decrease opportunities for downtown employees to live in the Downtown & Vicinity, thus increasing commute trips that would cross MUNI or regional screenlines.

Cumulative transportation analysis of Alternatives A, B, and N showed that there are few substantial differences in impact among the Alternatives./2/ The numerical differences in travel demand among Alternatives A, B, and N are greater than those between Alternative B and this variant. Therefore, the transportation impacts under this variant would not be statistically different. However, significant cumulative transportation impacts projected under Alternatives A, B and N would also occur under this variant.

AIR QUALITY

Motor vehicle trips generated by this variant would result in a 25% smaller net increase in vehicular emissions for the Project Area than that estimated for Alternative B (see Table VI.F.3, p. VI.F.14). Unlike Alternative B, HC emissions under this variant would not be significant on the basis of the BAAQMD's 1% significance threshold. However, emissions of CO and NO_x would still be significant. Like Alternative B, no excesses of curbside CO standards would occur within the Project Area. For this variant, total vehicular emissions would be about one-half of those under Alternative A and about 70% of those under Alternative N.

Stationary source emissions, considered negligible for Alternative B, would be greater under this variant due to those emissions that would be generated by industrial processes and activities. However, potentially significant industrial emissions would be abated by Best Available Control technology as required through BAAQMD rules and regulations. In all, industrial emissions under this variant would offset the reduction in vehicular emissions but not to such an extent that total Project Area emissions would be greater under this variant than under Alternative B.

With respect to the Air Quality Plan, this variant would allow for development that would be closer to projections used in the Plan to demonstrate attainment than that under Alternative B; it would, however, still exceed these projections.

NOISE

The decrease in peak-hour traffic associated with reducing the residential population in this variant would reduce average traffic noise levels, but probably not by an amount perceptible to the human ear. If the 23% net reduction in total travel demand forecast in Transportation were applied to automobile traffic along Third Street for example, the change in roadside noise levels would be an imperceptible 0.8 dBA, L_{eq} decrease. Similarly, increased truck traffic that would result from adding Port-Priority uses east of Third Street would probably not result in higher traffic noise levels along Third Street than in Alternative B. Although the actual increase in truck traffic that would occur along Third Street is not known, even a 100% increase in trucks, over the volume predicted for Alternative B in 2020, combined with the 23% reduction in automobiles, would not cause a noticeable increase in composite roadside noise levels along Third Street. Traffic noise in that area would be similar to that described for Alternative N (see p. VI.G.23), and could reach 80 dBA, L_{eq}, at residential uses along the west side of Third Street. Noise impacts at these receptors would be imperceptibly higher than for Alternative A or B.

The residential areas along the west side of Third Street could be exposed to some industrial / maritime process noise generated by this variant's Port-Related/M-2 uses on the east side of Third Street. However, traffic noise levels along Third Street itself would be so great (up to 80 dBA, L_{eq}) that industrial noises (estimated to be up to about 65 dBA,

L_{eq}, at this housing) would rarely be audible. In addition, noise insulation, which would be necessary for housing on the west side of Third Street, would also insulate against industrial noise to the east.

ENERGY

Total annual operational energy consumption would decrease by about 9% from that under Alternative B. That total decrease would be composed of approximately 0.4% and 18% decreases in electricity and natural gas consumption, respectively (see Table VI.H.2, p. VI.H.13). Construction energy consumption would decrease by about 890 from that estimated for Alternative B (see p. VI.H.8). Transportation energy consumption would be lower than under Alternative B (see p. VI.H.19), because total Project Area travel demand would be lower.

ARCHITECTURAL RESOURCES AND URBAN DESIGN

In this variant, views from Potrero Hill of the area east of Third Street would be similar to those described for that area in Alternative N (see p. VI.I.35). Substituting low-rise Port-Priority uses for Alternative B's wetlands, parkland and residential uses east of Third Street would reduce the visual amenities offered by those uses. The area east of Third Street would be developed more incrementally in this variant than it would under a master-planned development in Alternatives A or B, resulting in a less-coherent overall urban design.

GEOLOGY AND SEISMICITY

Not developing wetlands at China Basin and south of Pier 54 would reduce by about 212,000 cubic yards the amount of material that otherwise would need to be dry dredged and used or disposed of for Alternative B (see Table VI.K.1, p. VI.K.20). Fewer residents would be affected in the event of a major earthquake (see p. VI.K.42). To the extent that the M-2 / Port-Related area east of Third contains vacant land, it could offer potential areas for residents in the Project Area to gather in the event of an evacuation.

HYDROLOGY AND WATER QUALITY

Wetlands in Alternative B could offer some beneficial effects to water quality by trapping sediments and providing oxygen to the water (see p. VI.L.30). Forgoing the wetlands at China Basin and between Piers 54 and 64 in this variant could reduce those beneficial effects. From a hydrologic and water quality perspective, the mid-channel wetlands that would remain in this variant would be the least-viable wetlands location while the China Basin location would be the most-viable. Of the three wetland areas proposed in Alternative B, the mid-channel area would be subject to the worst water quality conditions, because it would have less tidal flushing and be closer to the sewer outfall.

VEGETATION AND WILDLIFE

This variant would forgo the benefits to shorebirds, herons and egrets, wetlands plant species and aquatic life that would be provided by wetlands at China Basin and along the bayfront (see VI.M. Vegetation and Wildlife, p. VI.M.9, and p. VI.M.17). The remaining mid-channel wetlands area would offer the lowest potential vegetation and wildlife benefits of the three wetland locations considered in Alternative B, but would offer some new areas for aquatic life and new plant and bird species in the Project Area compared to current conditions along the channel banks.

HAZARDOUS WASTES

Hazardous waste impacts would be similar to those under Alternative B, although potential impacts from site clean-up activities or undetected contamination would be slightly lower because of the reduction in housing and open space, and because of reduced excavation for wetlands. However, there might be slightly more potential for residents to be exposed to accidental releases of any hazardous materials handled by Port-Related/M-2 businesses.

GROWTH INDUCEMENT

This variant would result in less total housing and population in the City than would Alternative B. Not all of the difference would represent a shift to other parts of the region outside San Francisco, however. Some of the difference between this variant and Alternative B would mean relatively more housing demand and population growth in other parts of the City. There also would be more population growth and associated demand for housing and community services in various other locations throughout the region.

Other aspects of growth inducement would be similar to those for Alternative B, see pp. VI.O.1-VI.O.9, with the exception of land use conflicts between uses east of Third Street in the Project Area and activities on adjacent piers (see discussion under Land Use, Business Activity, and Employment heading on p. VII.12).

OTHER TOPICS

Other environmental effect of this variant not discussed above would be essentially the same as those in Alternative B (see VI.J. Cultural Resources, p. VI.J.20).

MITIGATION

Mitigation measures included for Alternative B (see Mitigation sections in Chapter VI.) would apply to this variant, with the following differences:

- A fire truck company that would be required in Alternative B (see Mitigation D.2, p. VI.D.115) would not be needed in this variant.
- Mitigation measures for Alternatives A and B to alleviate the exposure of residents along Third Street to vehicular noise would be more important in this variant because of increased truck traffic (see Mitigations G.4 and G.5, p. VI.G.32). In addition, placement of an acoustic wall along the west side of Third Street could reduce noise levels at the housing by up to 10 dBA, and provide an aesthetic screen.

3. REDUCED HOUSING DENSITY (ALTERNATIVE B)

This variant would reduce housing densities throughout the Project Area to 7,700 units, a reduction of 2,300 units from Alternative B (and the same number as in Alternative A). Under this variant, MDR would replace MHDR on the eight blocks north of the channel and one block south of 16th Street. Most of the MDR south of the channel and east of Third Street would be replaced with LDR (see Figure VII.3). That would result in about 1,530 fewer residents, for a total population of about 17,140 residents. Housing-related employment would be about 90 fewer employees than in Alternative B. Commercial, open space and other uses would remain the same. While similar in number of units to Alternative A, this variant would, as with Alternative B, have fewer commercial uses and more open space than would Alternative A.

HOUSING AND POPULATION

Compared with Alternative B, about 23% fewer housing units, including about 690 fewer affordable units, would be built. There would be about 1,530 fewer people living in Mission Bay with this variant. Generally, household characteristics would be similar to those in Alternative B (see p. VI.C.64). Reduced housing density would result in larger average unit sizes and thus relatively more larger households, including households with families and single parents with children. The Mission Bay population could therefore be

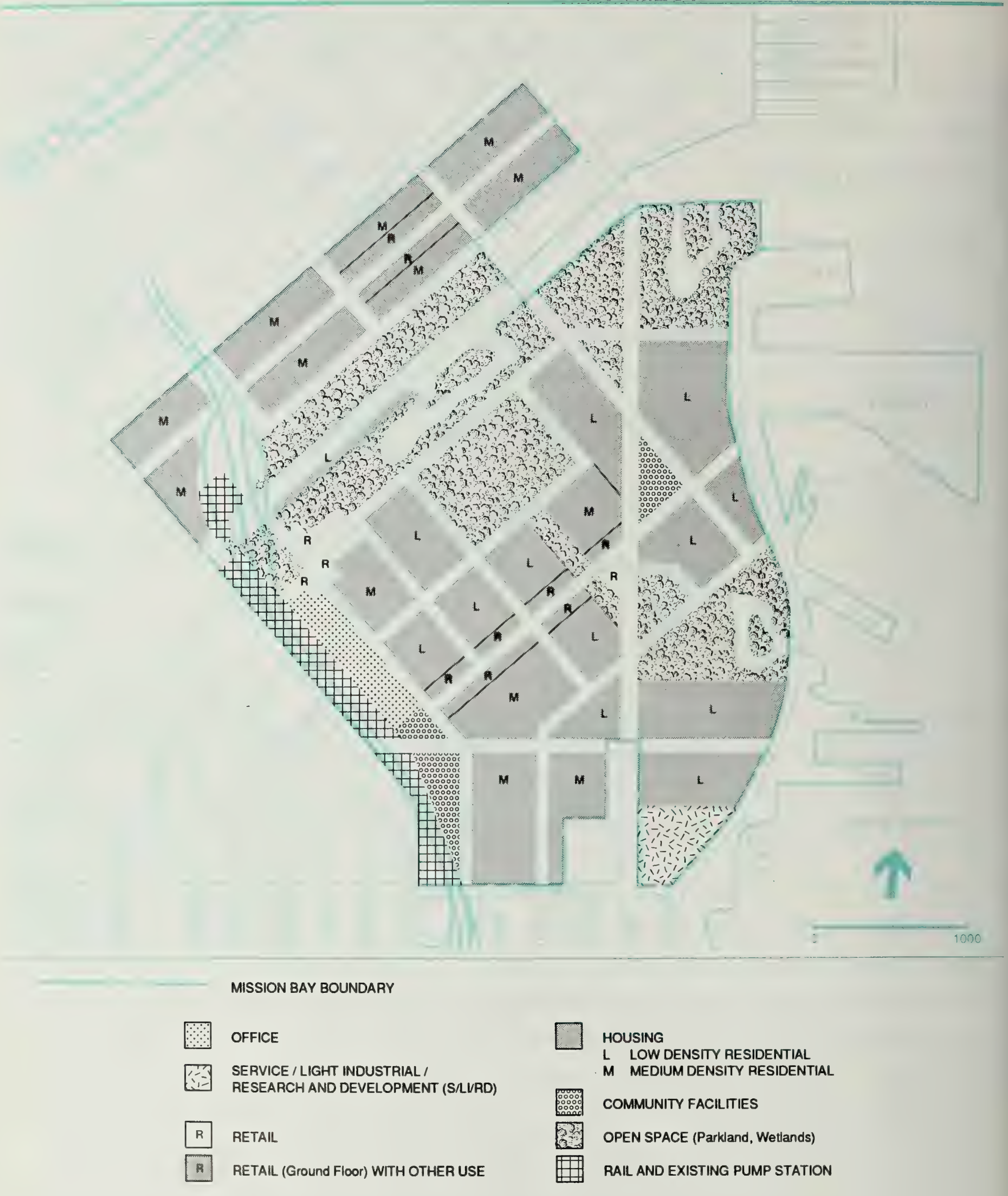

M
M
M
M
M
M
M
L
L
L
L
L
L
L
L
L
L
L
L
M
M
M
M
R
R
R
R
0
1000
MISSION BAY BOUNDARY
OFFICE
SERVICE / LIGHT INDUSTRIAL / RESEARCH AND DEVELOPMENT (S/LI/RD)
RETAIL
RETAIL (Ground Floor) WITH OTHER USE
HOUSING
L LOW DENSITY RESIDENTIAL
M MEDIUM DENSITY RESIDENTIAL
COMMUNITY FACILITIES
OPEN SPACE (Parkland, Wetlands)
RAIL AND EXISTING PUMP STATION

FIGURE VII.3
REDUCED HOUSING DENSITY (ALTERNATIVE B)

SOURCE: Environmental Science Associates, Inc.

relatively younger. With relatively more larger units, and therefore more persons per household, this variant would have a larger population than Alternative A, although the number of units would be the same.

The remaining total units (7,700) and affordable units (about 2,310, or 30% of the total units) would surpass the City's OAHPP requirement for Alternative B (see Table VI.C.19, p. VI.C.73). They would also exceed the housing demand of additional San Francisco households with Project Area workers (see Table VI.C.20, p. VI.C.78). The amount would be very similar to that described above for the port-priority variant (Variant 2) on Alternative B, so the conclusions summarized on p. VII.13 apply here as well.

COMMUNITY SERVICES AND INFRASTRUCTURE

Reducing Alternative B housing densities (and its population) would reduce community services needs. Fire incidents, and thus service hours, would be about 20% lower than in Alternative B. This variant would require a truck company by build-out and an engine company by the year 2000, as for Alternative B (see p. VI.D.41).

Police incidents would be about 20% lower than with Alternative B. However, this variant would require about 90% of the police personnel projected for Alternative B at build-out (see Table VI.D.5, p. VI.D.44), a need for about 85 people. Additional police station space would be needed to house these personnel.

The Project Area population for this variant would include about 175 (9%) fewer public school students in grades K-12 than the approximately 1,870 estimated in Alternative B (see Table VI.D.9, p. VI.D.57). About 62 classrooms and 105 teachers would be required, about six fewer classrooms and 11 fewer teachers than for Alternative B (see Table VI.D.10, p. VI.D.58).

The residential population in this variant would require about 86 acres of open space that would generally be accommodated by the 82 acres provided (not including open space associated with other areas). Demand for library services would be lower than in Alternative B (see p. VI.D.93). City responses to ambulance calls would be about 110 calls per year (8%) less than in Alternative B (see Table VI.D.21, p. VI.D.99). The paramedic and vehicle requirements associated with those calls would be proportionally reduced. Water demand and sewage generation would be about 7% less than in Alternative B (see Water Supply, Table VI.D.22, p. VI.D.101, and Sewers and Wastewater Treatment, Table VI.D.23, p. VI.D.104). Solid waste generation would be about 7% lower than in Alternative B (see Table VI.D.24, p. VI.D.109). Effects on streets would be the same as in Alternative B (see p. VI.D.114).

TRANSPORTATION

The reduction of 1,530 residents would result in 8% lower p.m. peak travel demand entering the Project Area than in Alternative B. The loss of 2,300 residential units would reduce housing-related employment by about 90 jobs. This decrease in employment within the Project Area would result in a 1% decrease in p.m. peak travel demand leaving Mission Bay.

The net change in total travel demand generated by this variant would be about 6% less than that forecast for Alternative B. This decrease would not significantly change projections of either cumulative screenline travel demand or intersection levels of service. The reduction in the number of housing units within the Project Area with this variant would have transportation effects similar to those previously discussed in the Port-Priority Retention Variant (Variant 2), which would fall within the range of impacts analyzed in Alternatives A, B, and N.

AIR QUALITY

Fewer motor vehicle trips would result in a 9% smaller net increase in vehicular emissions for the Project Area than that estimated for Alternative B (see Table VI.F.3, p. VI.F.14). Local and regional effects, however, would be virtually the same. Like Alternative B, no curbside excesses of CO standards would occur within the Project Area, but emissions would be significant on a County-wide basis. For this variant, total emissions would be about 57% of those under Alternative A and about 80% of those under Alternative N. With respect to the Air Quality Plan, this variant would allow for development that would be closer to, although still exceeding, the projections used in the Plan to demonstrate attainment.

ENERGY

Total annual operational energy consumption would be about 16% lower than in Alternative B (see Table VI.H.2, p. VI.H.13). Electricity consumption would be about 11% lower and natural gas consumption would be reduced by about 21%. Construction energy would be about 15% lower. Transportation energy consumption also would be lower than in Alternative B (see Construction Energy, p. VI.H.8, and Transportation Energy, p. VI.H.19).

ARCHITECTURAL RESOURCES AND URBAN DESIGN

The reduced housing density throughout the Project Area in this variant would reduce MHDR (averaging up to 100 feet high) to MDR (averaging up to 70 feet high) and most MDR to LDR (averaging up to about 50 feet high). The lower heights would provide less blockage of views from Potrero Hill than what would occur in Alternative B (see p. VI.I.33). The overall scale of buildings in this variant would be lower and more uniform than Alternative B. Streetscape including seven- to eight-story MHDR buildings in Alternative B north of the channel would be replaced by five- to six-story MDR buildings. West of Third Street five- to six-story MDR would be replaced by three- to four-story LDR. For example, the MDR along the north side of Berry Street would be only as high as six stories with this variant, as opposed to eight-story MHDR in Alternative B, illustrated in Figure VI.I.7, pp. VI.I.42-VI.I.43 and Figure VI.I.8, pp. VI.I.46-VI.I.47. The scale of MDR buildings would be similar to that illustrated in Figure VI.I.10, pp. VI.I.52-VI.I.53 for Alternative A. Alternative B in Figure VI.I.10 depicts LDR units near the central open space south of the channel. That scale of development would characterize most of the west of Third Street area in this variant.

The LDR buildings in this variant would create less shadow on Project Area open space, particularly OS-5, OS-8, and OS-9, that would be adjacent to LDR replacing MDR. Overall shadow characteristics of this variant, however, would not differ substantially from those of Alternative B.

GEOLOGY AND SEISMICITY

Decreased housing density in this variant would provide the potential for allowing more shallow foundations in some areas than those expected in Alternative B (see p. VI.K.32 and Figure VI.K.9, p.VI.K.26). Because the residential population would be smaller in this variant than in Alternative B, fewer people could be affected in the event of a major earthquake (see p. VI.K.42).

GROWTH INDUCEMENT

This variant would contribute less to housing and population growth in the City than would Alternative B. The difference in population would be relatively small, however. Generally, the growth inducement aspects of this variant would be the same as those described for Alternative B (see pp. VI.O.1–VI.O.9).

HAZARDOUS WASTES

Hazardous waste impacts would be similar to those under Alternative B, although potential impacts from site clean-up activities or undetected contamination would be slightly lower because of fewer residents under this variant.

OTHER TOPICS

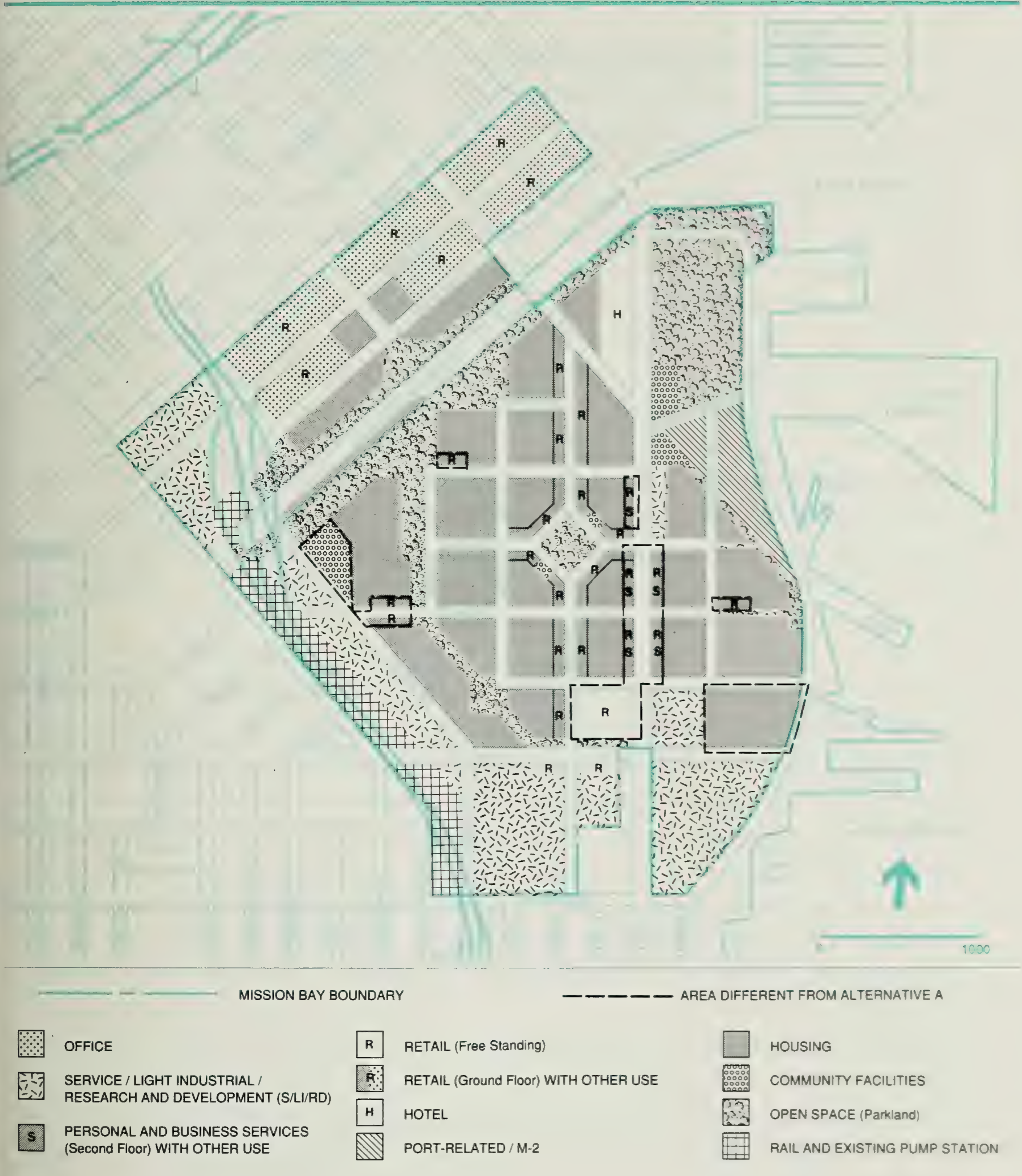
Other environmental effects of this variant would be the same as those in Alternative B (see VI.A. Public Plans, Policies and Permits, starting on p. VI.A.34; VI.B. Land Use, Business Activity and Employment, starting on pp. VI.B.80; VI.G. Noise, pp. VI.G.17, VI.G.23, VI.G.26; VI.J. Cultural Resources, p. VI.J.20; VI.L. Hydrology and Water Quality, pp. VI.L.14, VI.L.18, VI.L.21, VI.L.28, VI.L.30; and VI.M. Vegetation and Wildlife, pp. VI.M.9, VI.M.17).

MITIGATION

Mitigation measures included for Alternative B would apply to this variant. See Mitigation sections in Chapter VI. Environmental Setting, Impact and Mitigation.

4. REPLACEMENT OF SOME S/LI/RD WITH PERSONAL AND BUSINESS SERVICE SPACE AND INCREASED RETAIL AND COMMUNITY FACILITIES (ALTERNATIVE A)

As shown in Figure VII.4, this variant would add about 275,000 square feet of retail-commercial space to Alternative A, reduce S/LI/RD space by 275,000 square feet and add about two acres along Owens Street for a community facilities site suitable for a school. The retail-commercial space would include about 185,000 square feet of ground-floor retail and 90,000 square feet of second-floor personal and business services space. Personal and business service space would include services such as health clubs and hair salons, business services such as photocopy shops and printing shops, and small-scale professional and medical offices. Along Third Street, retail plus personal and business


R
H
R S
0
1000
MISSION BAY BOUNDARY
AREA DIFFERENT FROM ALTERNATIVE A
OFFICE
SERVICE / LIGHT INDUSTRIAL / RESEARCH AND DEVELOPMENT (S/LI/RD)
S
PERSONAL AND BUSINESS SERVICES (Second Floor) WITH OTHER USE
R
RETAIL (Free Standing)
R
RETAIL (Ground Floor) WITH OTHER USE
H
HOTEL
PORT-RELATED / M-2
HOUSING
COMMUNITY FACILITIES
OPEN SPACE (Parkland)
RAIL AND EXISTING PUMP STATION

Mission Bay

SOURCE: Environmental Science Associates, Inc.

FIGURE VII.4

REPLACEMENT OF SOME S/LI/RD WITH PERSONAL AND BUSINESS SERVICE SPACE AND INCREASED RETAIL AND COMMUNITY FACILITIES (ALTERNATIVE A) services space would total about 220,000 square feet in this variant; there would be none along Third Street in Alternative A. Retail space in this variant along Long Bridge Street would total about 205,000 square feet, about 40,000 square feet more than in Alternative A; that addition would be a large-scale retail space suitable for a supermarket with on-site parking, on the block bounded by Long Bridge, Third, 16th and 15th Streets. Retail uses in office north of China Basin Channel would be reduced from about 85,000 square in Alternative A to 40,000 square feet. In addition to the retail locations in Alternative A, a total of about 20,000 square feet of incidental neighborhood support retail would be provided at four residential relocations in the Project Area (at Tiernan and North Iowa Streets, on both sides of Alameda Street near Owens Street, and at Alameda and Michigan Streets).

Analysis of this variant also assumes that the required off-street parking for retail uses would be reduced from the one space per 1,000 square feet of retail floor area that is assumed for Alternatives A and B. In this variant, the required off-street parking assumed for both retail and personal and business services would be one space per 2,500 square feet of floor area.

The MHDR (195-units) that would otherwise have occupied the community facilities site, and the MDR (240) that would otherwise have occupied the large-scale retail site, would be relocated in this variant to the block east of Third Street between 15th and 16th Streets. The 1,330,000 square feet of S/LI/RD space east of Third and south of 15th Street in Alternative A would be reduced by about 275,000 square feet, leaving a total of 3,325,000 square feet of S/LI/RD space in the Project Area. The residential population and number of dwelling units would be the same as in Alternative A (see p. VI.C.39). There would be about 330 more jobs in the Project Area with this variant than in Alternative A.

LAND USE, BUSINESS ACTIVITY, AND EMPLOYMENT

The 330 more jobs would be the net result of adding about 840 retail and personal and business services jobs and 135 community facilities jobs, while subtracting about 645 S/LI/RD jobs. The types of jobs in the Project Area would be different with this variant than with Alternative A. There would be more jobs in sales occupations and fewer in crafts, operatives, and other occupations. The service, professional / technical and managerial jobs would be of the types associated with retail activity, smaller office and service businesses, and a school or other community facility, as opposed to the types associated with the larger companies likely to occupy S/LI/RD development.

The space for personal and business service activities in this variant would offer locations in Mission Bay for small office and other service businesses that would not be accommodated in Alternative A in either the large-scale office development north of the channel or S/LI/RD development; space for such business would also not be available in Alternative B. The personal and business service uses would add to the mix of business activity and diversity of business opportunities in the Project Area.

More of the retail spending of Project Area residents and workers would be captured in Mission Bay with this variant compared to Alternative A. With a supermarket in the Project Area, residents would have a more convenient option for grocery shopping than they would in Alternative A, and would be expected to do most of their convenience shopping there. Some people who worked in the Project Area but lived elsewhere also would do their convenience shopping in Mission Bay. Residents of nearby neighborhoods would partronize the Mission Bay supermarket. With this variant, it is unlikely that a supermarket or neighborhood center would be developed elsewhere in the vicinity outside Mission Bay (e.g., in the South of Market area).

Other Mission Bay retail space in this variant would be supported by Project Area residents and workers as well as by the spending people from outside the Project Area. In Alternative A, a relatively small amount of Mission Bay retail space would depend on spending by people from outside the Project Area. This variant adds a large amount of retail space, in addition to the supermarket, that would depend on that support. To the extent that the additional 145,000 square feet of retail space (not counting the 40,000 square-foot supermarket or the 90,000 square feet of second-floor personal and business service space) were developed as small stores, shops, and restaurants and not as large-scale outlets, the Mission Bay retail space would compete with other neighborhood shopping areas. Compared to Alternative A, there could be somewhat less sales growth in older neighborhood shopping areas on Potrero Hill or in the Mission District, for example. The special character associated with those established neighborhood shopping areas would continue to attract area residents and others, including future Mission Bay residents, people from other parts of the City and other visitors, however. The large amount of new retail development proposed in this variant might have more effect on the potential for other new retail in the vicinity (e.g., South Beach, Yerba Buena Gardens, Showplace Square and other South of Market locations), since Mission Bay retail would offer similar types of stores and restaurants and would be competing with those other developments for spending from that broader market consisting of workers, residents, and visitors in the Downtown & Vicinity.

COMMUNITY SERVICES AND INFRASTRUCTURE

The two-acre community facilities site at Owens and Alameda Streets could be used for a school. Because of the proximity to open space areas, a 450-student elementary, 850-student middle, or 600-student small alternative high school could be accommodated on the two-acre site. Alternatively, the community facilities site could be used for police, fire or other facilities. Need for open space in this variant would be slightly higher than in Alternative A because of the somewhat larger Project Area employment, as well as increased use of open space areas by retail shoppers (see p. VI.D.83). Water use, and thus wastewater generation, would be slightly lower than in Alternative A in this variant because retail uses demand less water than S/LI/RD uses that otherwise would be included in Alternative A. A few more public health inspectors than in Alternative A may be needed to inspect the additional eating and drinking establishments that could occupy the retail space. Fire protection, police protection, ambulance services, libraries, and solid waste generation would be about the same as in Alternative A (see starting on pp. VI.D.32).

TRANSPORTATION

The increase of about 330 employees projected by the trade-off between retail and community facilities jobs and jobs associated with S/LI/RD would generate about a 1% increase in p.m. peak travel demand leaving Mission Bay. The residential population of the Project Area would remain unchanged. The net change in total travel demand generated by this variant would be an increase of less than 1% above that forecast for Alternative A. That increase would not significantly change projections of either cumulative screenline travel demand or intersection levels of service.

Off-peak travel demand associated with personal and business services and retail uses would increase under this variant. Vehicular congestion, however, would not be expected to increase because the location of these chiefly local-serving uses within the residential corridors on Third and Long Bridge Streets, would encourage pedestrian and transit travel modes. The large-scale retail (suitable for a supermarket) at Third and 16th Streets could attract off-peak trips from a greater distance. The p.m. peak-hour vehicle trips attracted by this large-scale retail use would chiefly be local trips within the Project Area and passersby (people already on Third Street for another purpose). The change in p.m. peak-hour traffic through local intersections would not be noticeable, and off-peak traffic would be noticeably less than during the p.m. peak period.

Under this variant, the off-street parking supply rate for retail and personal and business services uses would be reduced from one space per 1,000 square feet to one space per 2,500 square feet of floor area. That reduction in parking supply, together with an increase in parking demand associated with the additional retail and personal and business services space (which have a higher parking demand rate than the correspondingly decreased S/LI/RD space), would result in a net increase of about 480 spaces in the 990-space parking deficit projected for Alternative A at full build-out. The impact of excess parking demand on areas adjacent to the Project Area to the west and south, identified in Alternative A, would worsen as would the impact of overflow retail-generated parking on residential areas within the Project Area.

Mitigation measures to reduce parking impacts for Alternative A (described in VI.E. Transportation, pp. VI.E.207-VI.E.209, and pp. VI.E.222-VI.E.223), would apply to this variant as well.

AIR QUALITY

Daily vehicle trips and corresponding vehicle emissions under this variant would be about the same as for Alternative A. Since pollutant emissions under this variant would be virtually the same as those under Alternative A, the local and regional effects would also be the same. That is, no excesses of curbside CO standards would occur within the Project Area (including at the school site), but emissions would be significant on a county-wide basis. This variant would be more consistent than Alternative A with the Air Quality Plan in that it includes more neighborhood retail uses and community facilities which would encourage pedestrian and public transit modes of travel. However, like Alternative A, this variant would be inconsistent with the Air Quality Plan in that it allows for more intensive development of the Project Area than was assumed for the Plan.

NOISE

This variant would introduce a school (or other community facilities) into an area identified in the Noise Impacts Analysis as being incompatible with such land uses. Existing and future (2020) 24-hour noise levels near Owens Street would exceed 65 dBA, L_{dn}, a level established by the Land Use Compatibility Chart for Community Noise (see Figure VI.G.1, p. VI.G.4) as being incompatible with construction or development of schools. Future peak-hour outdoor noise levels would reach 70 dBA, L_{eq}, which would inhibit enjoyment of outdoor activities. These high outdoor noise levels would be produced by traffic on the I-280 overpass about 100 feet to the west, and by locomotives at the relocated CalTrain station about 300 feet to the southwest. Noise from the latter source would be partially attenuated by S/LI/RD development planned for Owens Street. Compatibility could be achieved through inclusion of noise insulation features in the design of the school. Those features would be identified through a detailed analysis of the noise reduction requirements. As is true for all housing in any location in Mission Bay, housing planned to replace S/LI/RD between 15th and 16th Streets east of Third Street would be located where noise levels are estimated to exceed the Land Use Compatibility guidelines for that land use. However, traffic noise impacts on that housing generated from Third Street would be partially attenuated by intervening buildings containing S/LI/RD activities. Special noise insulation features would need to be included in the design of the housing.

A 1% increase in the peak-hour vehicle traffic identified for Alternative A, would be produced by this variant (see Transportation). If the 1% increase affected all Project Area streets, then the largest automobile increase would occur along I-280, and the largest truck increase would occur along Third Street. The increases in traffic volume would be about 70 automobiles and seven trucks, respectively, which would have no noticeable effect on Project Area or roadside noise levels.

Construction noise impacts for this variant would be the same as those for Alternative A at build-out, as described on p. VI.G.12. The addition of retail space would have no effect on Project Area or roadside noise levels.

Replacement of ground and second-floor housing along Third Street with retail space would eliminate the most noise-sensitive receptors from those locations, thereby reducing noise impacts along this busy corridor. Although less sensitive to noise than housing, the retail uses also would be incompatible with noise levels at these locations without some noise insulation.

ENERGY

Total annual operation energy consumption would be about the same as under Alternative A (see Table VI.H.2, p. VI.H.13). Electricity and natural gas consumption would decrease slightly (less than 1%) with the shift of 275,000 square feet of space from S/LI/RD to retail; that decrease could be partially offset by a new school building. Construction and transportation energy consumption would increase by 1% or less.

ARCHITECTURAL RESOURCES AND URBAN DESIGN

The overall urban design and view effects of this variant would be similar to Alternative A. The additional retail uses with this variant would create more street-level variety of activity and design, compared to the all-residential street frontages on Third Street and in other areas in Alternative A.

GROWTH INDUCEMENT

The larger amount of retail space in this variant compared to Alternative A would capture a larger share of Mission Bay resident and worker retail spending and also would accommodate retail activity that otherwise would locate elsewhere in the City. Compared to Alternative A, this variant would result in less spillover effect associated with retail demand in Nearby Areas. That is because the variant provides for a supermarket, resulting in a larger share of Mission Bay residents' retail spending remaining in the Project Area rather than being spread among other neighborhood shopping streets or contributing to support of another supermarket in the vicinity.

Since this variant provides less space in the Project Area for S/LI/RD activities than does Alternative A, there could be somewhat more demand for that type of development outside the Project Area, in nearby industrial/commercial areas or in other parts of the region. Thus, while retail activity would be more concentrated in the Project Area under this variant than it would under Alternative A, S/LI/RD development would be more dispersed.

Other aspects of growth inducement would be the same as those described for Alternative A on pp. VI.O.1-VI.O.9.

OTHER TOPICS

Other environmental effects of this variant would be the same as those in Alternative A (see VI.A. Public Plans, Policies, and Permits, starting on p. VI.A.34; VI.C. Housing and Population, starting on p. VI.C.64; VI.I. Architectural Resources and Urban Design, p. VI.I.24; VI.J. Cultural Resources, p. VI.J.19; VI.K. Geology and Seismicity, pp. VI.K.22, VI.K.31, VI.K.42; VI.L. Hydrology and Water Quality, pp. VI.L.14, VI.L.18, VI.L.21, VI.L.23; VI.M. Vegetation and Wildlife, pp. VI.M.7, VI.M.14; and VI.N. Hazardous Waste, p. VI.N.37).

MITIGATION

Mitigation measures included for Alternative A would apply to this variant. See Mitigation sections in Chapter VI. Environmental Setting, Impact and Mitigation. Two additional noise mitigation measures are recommended:

- Design and development of a school on Owens Street should proceed only after a detailed analysis of noise reduction requirements has been completed; the design should incorporate noise reduction features thus identified.
- Design and development of retail uses along Third Street should also incorporate the results of a detailed analysis of noise reduction requirements.

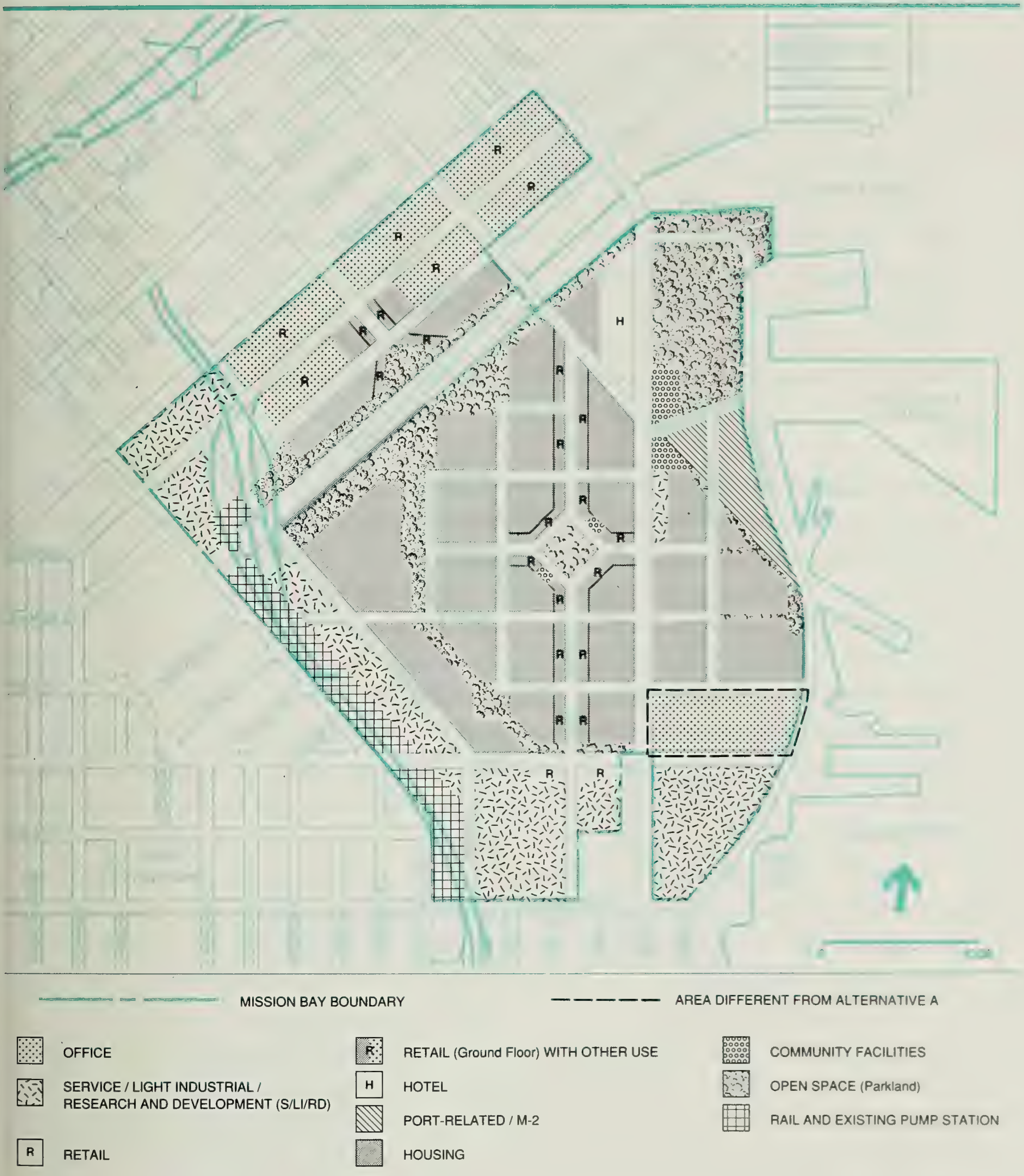
5. REPLACEMENT OF SOME S/LI/RD WITH OFFICE (ALTERNATIVE A)

This variant would replace about 580,000 square feet of S/LI/RD east of Third Street between 15th and 16th Streets in Alternative A with 600,000 square feet of offices (see Figure VII.5). All other uses would be the same as in Alternative A.

LAND USE, BUSINESS ACTIVITY, AND EMPLOYMENT

This variant would introduce office uses south of the channel. The offices would buffer housing proposed north of 15th Street from S/LI/RD light industrial uses. Replacing some S/LI/RD with office would result in about 700 more jobs in the Project Area at build-out, representing about 3% more total employment than Alternative A. This net change would reflect about 2,070 more office jobs and 1,360 fewer S/LI/RD jobs. The differences in the character of office and S/LI/RD activities also would affect the mix of types of jobs in the Project Area. There would be more jobs for clerical and professional / technical workers and fewer jobs for service and craft / operative / other workers.

Most additional employment in the Project Area as a consequence of replacing some S/LI/RD with office would be employment that otherwise would be elsewhere in San Francisco, most likely in other parts of the Downtown & Vicinity, particularly South of Market. Thus, from the cumulative perspective, the activity already is included in the employment growth scenarios analyzed in the EIR. Even if the additional Project Area employment were added to the cumulative scenarios, the amount is not large enough to make a difference in the citywide and regional scenarios or the implications of those scenarios.


R
H
MISSION BAY BOUNDARY
AREA DIFFERENT FROM ALTERNATIVE A
OFFICE
SERVICE / LIGHT INDUSTRIAL / RESEARCH AND DEVELOPMENT (S/LI/RD)
R RETAIL
R RETAIL (Ground Floor) WITH OTHER USE
H HOTEL
PORT-RELATED / M-2
HOUSING
COMMUNITY FACILITIES
OPEN SPACE (Parkland)
RAIL AND EXISTING PUMP STATION

Mission Bay

FIGURE VII.5
REPLACEMENT OF SOME S/LI/RD WITH OFFICE (ALTERNATIVE A)

SOURCE: Environmental Science Associates, Inc.

HOUSING AND POPULATION

More office employment in Mission Bay would mean larger OAHPP requirements. The additional in-lieu fee required for the additional 600,000 square feet of office space would be about $3.2 million. To satisfy the OAHPP requirement with housing development would mean an additional 232 units, 144 to be affordable to moderate- or low-income households. The number of housing units to be built in the Project Area under Alternative A (7,700) would more than satisfy the total OAHPP housing development requirement (1,815 units counting the units associated with the additional office space). The OAHPP requirement would be satisfied if 14.6% of the 7,700 units were affordable to moderate- or low-income households.

More total employment in the Project Area would mean more overall housing demand associated with Project Area employment growth. The additional employment (700 jobs) would result in the need for about 110 housing units to accommodate the additional San Francisco households with Project Area workers, including about 85 additional affordable units. With this variant, the number of housing units built (7,700) still would exceed the number of units needed to accommodate Project Area employment growth (about 3,620 units counting those associated with the additional employment). The number of affordable housing units needed would represent about 37% of total units, a higher percentage than the 30% assumed to be priced at affordable levels and a higher percentage than the 36% estimated for Alternative A. Some households with Project Area workers would have incomes below the levels needed to pay the affordable new housing prices assumed for Alternative A. The number of such households would be larger with the additional employment associated with this variant. (The discussion for Alternative A of the implications of these estimates would apply to this variant as well. See pp. VI.C.70-VI.C.75.)

Since the larger amount of employment in the Project Area as a consequence of replacing some S/LI/RD with office would most likely represent a shift of business activity that would otherwise locate elsewhere in the City, there would be no difference in cumulative housing demand with this variant. Consequently, the conclusions about implications for citywide and regional housing market conditions described in VI.C. Housing and Population, pp. VI.C.81-VI.C.86, would still apply.

TRANSPORTATION

The increase of about 700 employees would generate a 3% increase in p.m. peak travel demand leaving Mission Bay. The residential population of the Project Area would remain unchanged. The net change in total travel demand generated by this variant would be an increase of less than 2% above that forecast for Alternative A. This increase would not significantly change projections of either cumulative screenline travel demand or intersection levels of service./2/

AIR QUALITY

Daily vehicle trips and corresponding vehicular emissions under this variant would be about the same as those for Alternative A. Since pollutant emissions under this variant would be virtually the same as under Alternative A, the local and regional effects would also be virtually the same. That is, no excesses of curbside CO standards would occur within the Project Area, but emissions would be significant on a County-wide basis. Like Alternative A, this variant would be consistent with some aspects of the Air Quality Plan and inconsistent with others. This variant would be more inconsistent by allowing for more intensive development of the Project Area than would occur under Alternative A.

NOISE

This variant would replace S/LI/RD space with office space. Office space is identified by the Land Use Compatibility Chart for Community Noise (see Figure VI.G.1, p. VI.G.4) as being slightly more noise sensitive than commercial land use such as S/LI/RD. A noise analysis would be required to identify needed noise insulation features for the office space.

A 3% increase in the peak-hour vehicle traffic identified for Alternative A, would be produced by this variant (see Transportation). If the percentage increase affected all Project Area streets, then the largest automobile increase would occur along I-280, and the largest truck increase would occur along Third Street. The increases in traffic volume would be about 200 automobiles and 20 trucks, respectively. Resulting noise levels would be the same as those identified for Alternative A (see p. VI.G.22). Traffic increases of this magnitude, and less for other Project Area streets, would increase noise levels by less than 1 dBA, L_{eq}, and would have no noticeable effect on Project Area or roadside noise levels.

Construction noise impacts would be the same for this variant as those for Alternative A, as described beginning on p. VI.G.10.

ENERGY

Total annual operational energy consumption would be about the same as under Alternative A (see Table VI.H.2, p. VI.H.13). Electricity and natural gas consumption would increase slightly (by less than 1%) with the additional office space. Construction energy would be about 3% higher; transportation energy could also increase slightly.

ARCHITECTURAL RESOURCES AND URBAN DESIGN

Development of office uses east of Third Street in this variant would be at a density of less than one FAR (ratio of floor area to land area). Thus, building scale would likely be low. Tall buildings, while possible, would not be likely (height limits for office use in the Project Area would be 110 feet, compared to 60-foot height limit assumed for S/LI/RD uses). The variant would retain the overall "bowl" character of building heights similar to Alternative A.

Other urban design effects would be similar to those of Alternative A.

GROWTH INDUCEMENT

This variant would result in somewhat different development patterns for office and S/LI/RD activities than would be expected with Alternative A, as well as a somewhat different set of development pressures for areas outside the Project Area.

By accommodating more office development in the Project Area than would Alternative A, the variant would result in relatively less demand for new office development in other parts of the Downtown & Vicinity. This could mean somewhat lower rents and less development pressure affecting existing space and older businesses. On the other hand, this variant would accommodate fewer S/LI/RD activities in the Project Area than would Alternative A. Some of those activities would look for space South of Market and in other nearby industrial / commercial areas instead. This could put a different source of development pressure on existing space and older businesses. Some of the S/LI/RD development that would not occur in Mission Bay under this variant would occur elsewhere in the region instead.

With the exception of these differences in the types of development in various locations, most of the aspects of growth inducement described for Alternative A on pp. VI.O.1-VI.O.9 apply to this variant as well.

OTHER TOPICS

Other environmental effects of this variant would be the same as those in Alternative A (see VI.A. Public Plans, Policies, and Permits, starting on p. VI.A.34; VI.C. Housing and Population, starting on p. VI.C.64; VI.J. Cultural Resources, p. VI.J.19; VI.K. Geology and Seismicity, pp. VI.K.22, VI.K.31, VI.K.42; VI.L. Hydrology and Water Quality, pp. VI.L.14, VI.L.18, VI.L.21, VI.L.23; VI.M. Vegetation and Wildlife, p. VI.M.7, VI.M.14; and VI.N. Hazardous Wastes, p. VI.N.37).

MITIGATION

Mitigation measures included for Alternative A would apply to this variant (see Mitigation sections in Chapter VI. Environmental Setting, Impact and Mitigation).

6. INCREASED HOUSING HEIGHTS (Alternative B)

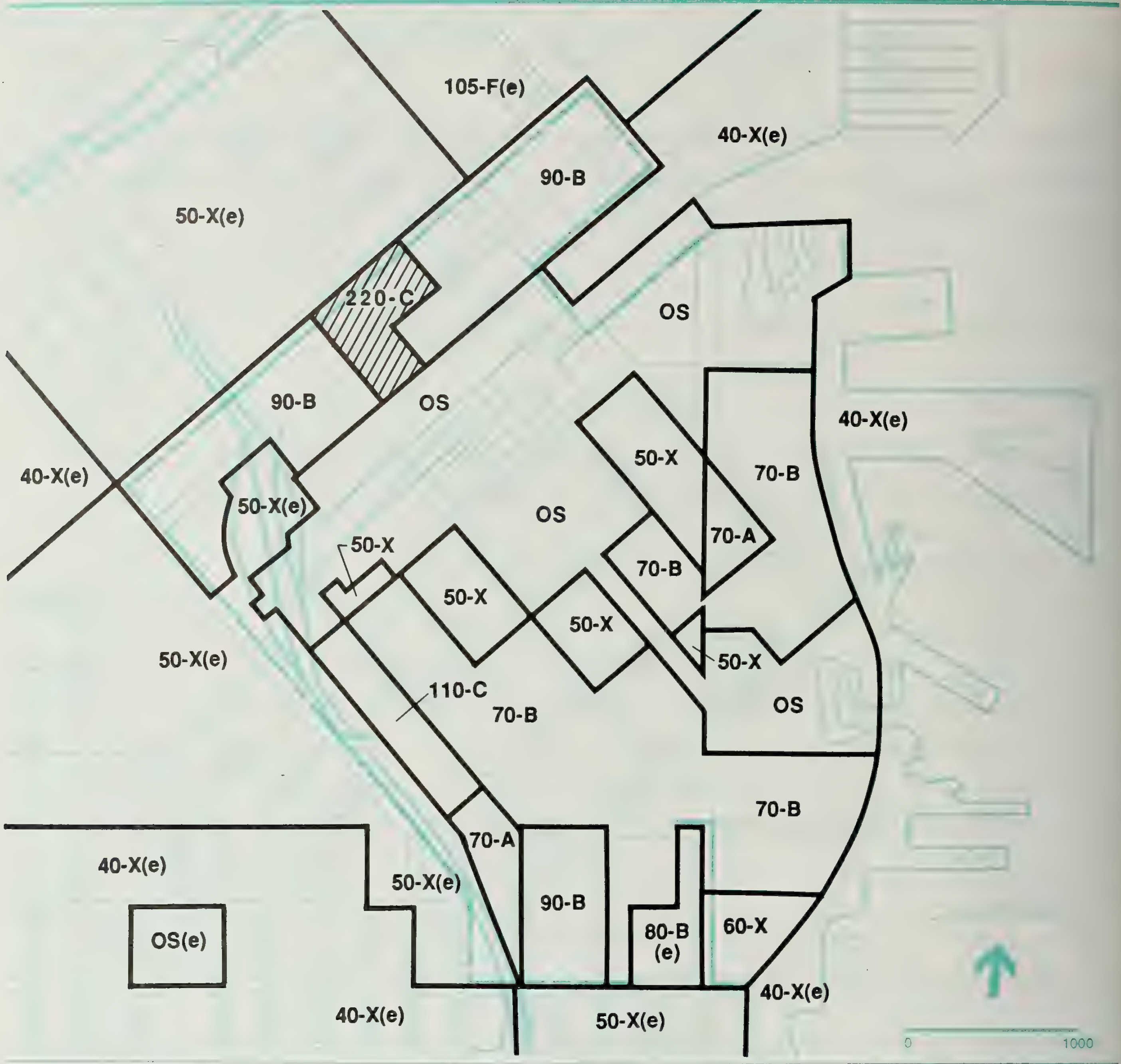
As shown in Figure VII.6, this variant would increase the heights of residential buildings on three corners at Fifth and King Streets north of the channel in Alternative B. Those locations are occupied by MHDR in Alternative B. The buildings in this variant would be up to 220 feet in height, with 20 stories of housing above two stories of retail. Above the fifth floor, there would be about six housing units per floor, while below the fifth floor, each building would have a wider base (podium) that could accommodate more housing units and retail on the first two stories. Although the buildings on these corners would be taller than those in Alternative B, average unit size would be the same as in Alternative B. Thus, the number of dwelling units and residential population in this variant would be the same as in Alternative B (see p. VI.C.66)

COMMUNITY SERVICES AND INFRASTRUCTURE

Community services impacts would be the same as for Alternative B, except that the taller buildings would need to conform to the stricter high-rise requirements of the San Francisco Fire Safety Code. Also, upper stories could be more difficult to reach during a fire or medical emergency than units in lower-rise buildings.

ARCHITECTURAL RESOURCES AND URBAN DESIGN

The 220-foot-high residential buildings of this variant would be about twice as high as the maximum 110-foot-high buildings assumed for Alternative B, and would be more prominent from long-range and street-level viewpoints.


105-F(e)
40-X(e)
90-B
50-X(e)
220-C
OS
90-B
OS
40-X(e)
40-X(e)
50-X(e)
50-X
70-B
OS
70-A
50-X
70-B
50-X
50-X
50-X(e)
50-X
110-C
70-B
OS
70-B
70-A
40-X(e)
50-X(e)
90-B
80-B (e)
60-X
OS(e)
40-X(e)
50-X(e)
40-X(e)
0
1000

— MISSION BAY BOUNDARY

(e) EXISTING HEIGHT AND BULK DISTRICT

NUMBERS INDICATE HEIGHT LIMITS IN FEET. LETTERS INDICATE BULK LIMITS AS FOLLOWS:

▨ HEIGHT DISTRICT DIFFERS FROM ALTERNATIVE B

Letter	Height above which Maximum Dimensions Apply	Maximum Building Length	Maximum Diagonal Dimension
A	40	110	125
B	50	110	125
C	80	110	125
F	80	110	140
X	Bulk Limits Not Applicable		
OS	See City Planning Code Section 290		

NOTE: The Height and Bulk Districts characterizations indicated in the Project Area reflect districts defined in Article 2.5 of the City Planning Code that would accommodate the uses proposed in the Variant. See Table XIV.A.1.

FIGURE VII.6
INCREASED HOUSING HEIGHT
(ALTERNATIVE B)

SOURCE: Environmental Science Associates, Inc.

From the Potrero hill viewpoint discussed on p. VI.I.33, the variant would create a prominent high-rise focus north of the channel of three tall buildings that would contrast with the low- to mid-rise scale of Alternative B and the adjacent South of Market neighborhoods (see Figure VII.7). The 220-foot line represents the highest condition that could be seen from that Potrero Hill location, and does not imply that a solid wall of buildings would be constructed to that height in this variant. Because the number of dwelling units would not increase, the height of surrounding residential buildings could be lower, providing more variety in scale and less "benching" north of the channel than in Alternative B.

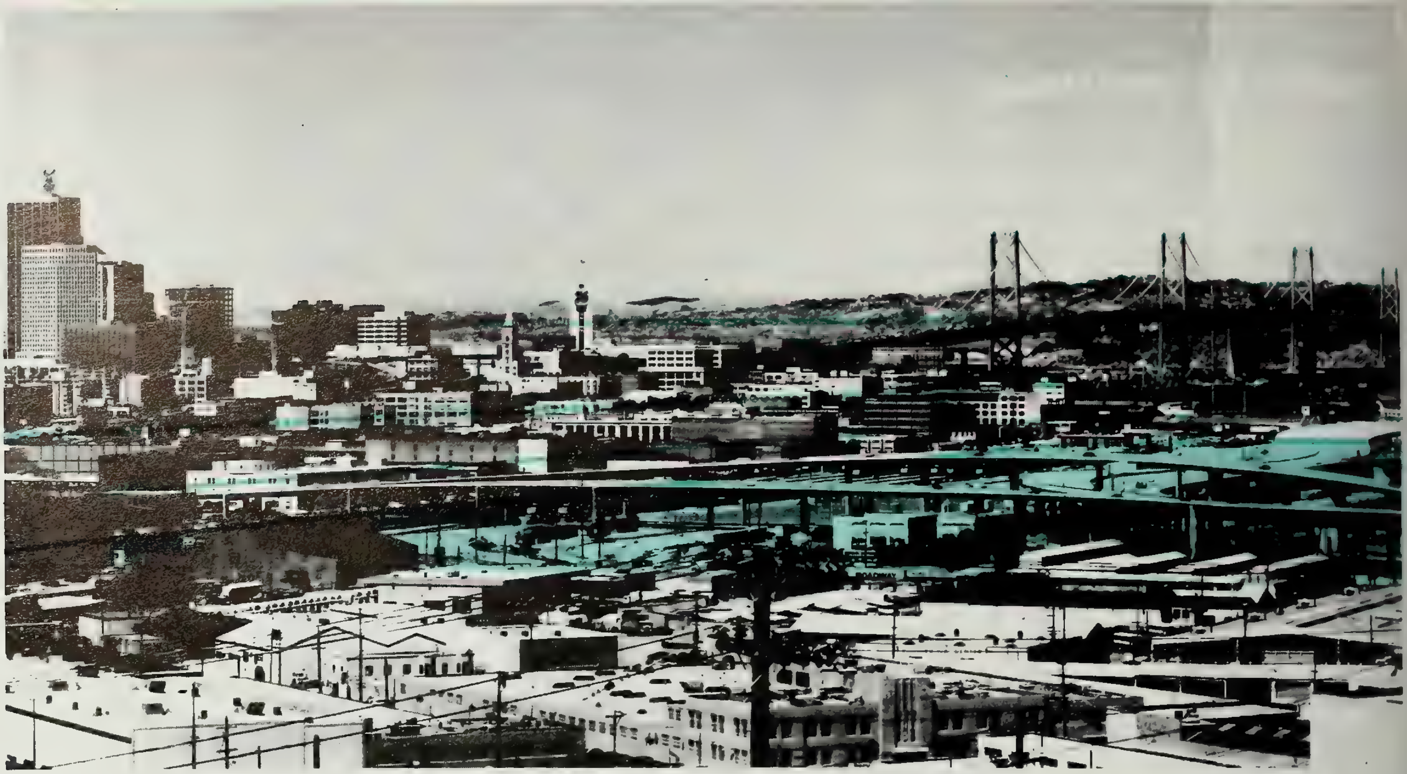
The 22-story residential towers would be visible from street-level areas within Mission Bay. Looking northwesterly from Fourth Street near the channel, the towers would be seen above mid-rise MHDR structures north of the channel. The high-rise towers would obscure distant views of Twin Peaks to a greater extent than Alternative B. The towers would also be visible from open space both north and south of the channel, also rising above seven- to eight-story buildings. From other residential streets of Alternative B west of Third Street, the 22-story buildings would be visible depending upon siting and configuration of buildings near the viewer. The residential towers would also be visible above other Mission Bay buildings from streets in South of Market, and from upper floors of high-rise buildings downtown.

The buildings of this variant would cast longer shadows than those of Alternative B, but those shadows would not reach public open space outside the Project Area. As in Alternative B, the buildings of this variant would shade Mission Bay open space north of the channel in afternoon hours during various times of the year.

The 220-foot towers could increase ground-level wind speeds in sidewalk and open space areas near Fifth and King Streets. Wind-tunnel testing would be appropriate when actual architectural and site plans for the towers and buildings in the vicinity are available.

GEOLOGY AND SEISMICITY

The 22-story MHDR buildings would be pile-supported. There would be increased danger to pedestrians from falling glass and cladding during an earthquake. The potential for damage and injury from movement of the contents of the buildings would be higher on the upper stories, depending on the rigidity of the buildings and their response to frequencies of earthquake motions. Other potential earthquake impacts would be the same as described in Alternative B (p. VI.K.42).



🟩 PROJECT AREA

PROJECT AREA BOUNDARY

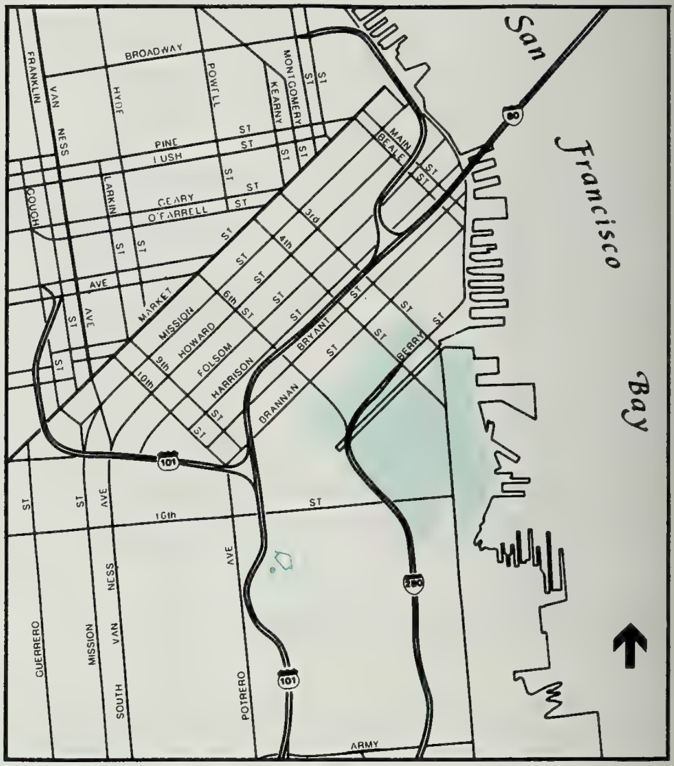
HEIGHT LIMITS (Lines drawn at furthest point from Potrero Hill viewpoint):

220 feet

110 feet

40 feet

GROUND LEVEL


San Francisco Bay
BROADWAY
FRANKLIN
VAN NESS
HYDE
POWELL
KEARNY
MONTGOMERY
ST
PINE
BUSH
GEARY
O'FARRELL
GOUGH
LARKIN
MAIN
BEALE
3rd
4th
AVE
MARKET
MISSION
HOWARD
6th
FOLSOM
HARRISON
BRYANT
BRANNAN
BERRY
9th
10th
80
101
16th
280
GUERRERO
MISSION
SOUTH VAN NESS
POTRERO
ARMY

The photograph was taken from the roof of Patrick Henry School, 639 Vermont Street near 18th Street, to provide an unobstructed view of the Project Area. Although the viewpoint is not publicly accessible, it is similar to views partially available from streets and residences on Potrero Hill.

FIGURE VII.7
VIEW FROM POTRERO HILL
INCREASED HOUSING HEIGHT (ALTERNATIVE B)

SOURCE: Roger Owen Boyer and Associates

OTHER TOPICS

Other environmental effects of this variant would be the same as those of Alternative B (see VI.A. Public Plans, Policies, and Permits, p. VI.A.34; VI.B. Land Use, Business Activity, and Employment, starting on p. VI.B.80; VI.C. Housing and Population, starting on p. VI.C.64; VI.D. Community Services and Infrastructure, starting on p. VI.D.32; VI.E. Transportation, beginning on p. VI.E.83; VI.F. Air Quality, starting on p. VI.F.11; VI.G. Noise, pp. VI.G.17, VI.G.23, VI.G.26; VI.H. Energy, p. VI.H.7; VI.J. Cultural Resources, p. VI.J.20; VI.L. Hydrology and Water Quality, pp. VI.L.14, VI.L.18, VI.L.21, VI.L.28, VI.L.30; VI.M. Vegetation and Wildlife, pp. VI.M.9, VI.M.17; VI.N. Hazardous Wastes, p. VI.N.38, and VI.O. Growth Inducement, pp. VI.O.1–VI.O.9).

MITIGATION

Mitigation measures included for Alternative B would apply to this variant. (See Mitigation sections in Chapter VI. Environmental Setting, Impact and Mitigation.) In addition to those measures, the following would be necessary:

- Potential wind effects of buildings over 100 feet in height would be reviewed by a qualified wind consultant. The review would evaluate the need for wind break features or further detailed wind-tunnel studies of the proposed structures.

7. OFFICE AS A PRIMARY USE IN S/LI/RD DEVELOPMENT (ALTERNATIVES A AND B)

As defined for the Alternatives, S/LI/RD in Alternatives A and B would be characterized by service industrial, light industrial, research and development, institutional and wholesale/showroom uses (see V. The EIR Alternatives and Approval Process, pp. V.2–V.3). There is no S/LI/RD land use designation in Alternative N. Office would be allowed only as an accessory activity to the primary non-office functions of the users of the S/LI/RD development in Alternatives A and B. This section considers the implications of a change in the S/LI/RD designation to allow office as a primary use.

DIFFERENCE IN PROJECT AREA EMPLOYMENT AT BUILD-OUT/2020

The employment estimate for S/LI/RD in Alternatives A and B is based on assumptions about the mix of activities in that type of development and an appropriate employment density factor reflecting that mix (see Table XIV.A.2, p. XIV.A.10). Employment densities for S/LI/RD activities are generally lower than they are for office activities (i.e., S/LI/RD activities use more space per worker). If office were a major component of S/LI/RD development in Mission Bay, there would be more employment associated with that land use designation.

Alternative A

The magnitude of the potential difference in Project Area employment would depend on the amount of space that would be occupied by office activities. For example, if one-half of the S/LI/RD development in Alternative A were occupied at an employment density similar to that for office activity in a relatively low-density business park, then Project Area S/LI/RD employment at build-out would be about 9,900 instead of 8,400./3/ The difference of about 1,500 office workers would represent about 18% more S/LI/RD employment and about 6% more total employment in the Project Area. If more than half of the S/LI/RD development were occupied by office activities, the difference in employment for Alternative A would be greater than 1,500 workers. If less than half were occupied by office activities, there would be a smaller difference in employment.

Alternative B

Alternative B has a small amount of development in the southeast corner of the Project Area designated for S/LI/RD uses. By comparison to Alternative A, Alternative B S/LI/RD development would be less likely to attract office businesses because of its distance and isolation from other office activity. However, if, for example, one-half of the S/LI/RD development in Alternative B were occupied by office activities, there would be about 1,100 workers in S/LI/RD development instead of 900 at build-out./3/ The difference of 200 office workers would represent about 22% more S/LI/RD employment but only about 3% more total employment in the Project Area.

LAND USE, BUSINESS ACTIVITY, AND EMPLOYMENT

Allowing office as a primary use in S/LI/RD development would result in somewhat more total employment and job opportunities in the Project Area than would the more restrictive S/LI/RD designation assumed for Alternatives A and B. The difference in the character of S/LI/RD activity also would affect the mix of types of jobs in the Project Area. For both Alternatives A and B, more office businesses in the Project Area would result in more jobs for clerical and professional/technical workers and fewer jobs for service and craft/operative/other workers.

Most additional employment in the Project Area as a consequence of allowing office as a primary use in S/LI/RD development would be employment that otherwise would be elsewhere in San Francisco, most likely in other parts of the Downtown & Vicinity, particularly South of Market and Civic Center/South Van Ness. Thus, from the cumulative perspective, the activity already is included in the employment growth scenarios analyzed in the EIR. Even if the additional Project Area employment were added to the cumulative scenarios, the amount is not large enough to make a difference in the citywide and regional scenarios or the implications of those scenarios.

HOUSING AND POPULATION

Implications for the Office Affordable Housing Production Program Requirements (OAHPP)

Alternative A

More office employment in Mission Bay would mean larger OAHPP requirements. For Alternative A, assuming (for example) that one-half of S/LI/RD development were occupied by office activities and would be subject to the OAHPP, the additional in-lieu fee required would be about $9.6 million. To satisfy the OAHPP requirement with housing development would mean an additional 695 units in this example, 431 to be affordable to moderate- or low-income households. The number of housing units to be built in the Project Area under Alternative A (7,700) would more than satisfy the total OAHPP housing construction requirement (2,278 units counting the units associated with office activity in S/LI/RD development in this example). The OAHPP affordability requirement would be satisfied if 18.3% of the 7,700 units were affordable to moderate- or low-income households.

Alternative B

For Alternative B, assuming (for example) that one-half of S/LI/RD development were occupied by office activities, the OAHPP requirement would be satisfied by either an additional $1.1 million in-lieu fee, or construction of 81 housing units, 50 to be affordable to moderate- or low-income households. The number of housing units to be built in the Project Area under Alternative B would more than satisfy the total OAHPP housing construction requirement (467 units counting those associated with office activity in S/LI/RD development in this example). The OAHPP affordability requirement would be satisfied if 2.9% of the 10,000 units were affordable to moderate- or low-income households.

Implications for the Project Area Jobs/Housing Relationship

Alternative A

More total employment in the Project Area would mean more overall housing demand associated with Project Area employment growth. For Alternative A, the additional employment (assuming the example where one-half of S/LI/RD development would be occupied by office activity) would result in the need for about 230 additional housing units to accommodate the additional San Francisco households with Project Area workers, including about 180 additional units in the affordable category. With this variant, the number of housing units built under Alternative A (7,700) still would exceed the number of units needed to accommodate Project Area employment growth (about 3,740 units counting those associated with office activity in S/LI/RD development). With office activity in S/LI/RD development, the number of affordable housing units needed would represent about 38% of housing in Alternative A, a higher percentage than the 30% assumed to be priced at affordable levels, and a higher percentage than the 36% estimated for Alternative A without office activity in S/LI/RD. Some households with Project Area workers would have incomes below the levels needed to pay the affordable new housing prices assumed for Alternative A. The number of such households would be larger with office activity in S/LI/RD development than it would without the additional office employment. (The discussion for Alternative A of the implications of these estimates would apply to this variant as well. See pp. VI.C.70–VI.C.75.)

Alternative B

For Alternative B, the additional employment (assuming the example where one-half of S/LI/RD development would be occupied by office activity) would contribute the need for about 35 additional housing units, including about 30 affordable units. The number of housing units built in the Project Area still would exceed by a large amount the number of units needed to accommodate Project Area workers (10,000 units built compared to about 755 units needed). With office activity in S/LI/RD development, the number of affordable housing units needed would represent about 6% of new housing in Alternative B, a lower percentage than the 30% assumed to be priced at affordable levels. The 6% share is approximately the same as estimated for Alternative B because the number of additional affordable units associated with the additional employment (due to office activity in S/LI/RD) would be small relative to the large number of new housing units in Alternative B. There would be a small number of households with Project Area workers unable to pay the affordable new housing prices assumed. (The discussion for Alternative B of the implications of these estimates would apply to this variant as well. See pp. VI.C.75-VI.C.76.)

Implications for Housing Market Conditions

Since the larger amount of employment in the Project Area as a consequence of allowing office as a primary use in S/LI/RD development would most likely represent a shift of business activity that would otherwise locate elsewhere in the City, there would be no difference in cumulative housing demand with this variant. Consequently, the conclusions about implications for citywide and regional housing market conditions described in VI.C. Housing and Population, Impact: pp. VI.C.81-VI.C.86, would still apply.

COMMUNITY SERVICES

Any increase in employment would produce a small proportionate increase in demands for community services. Schools would not likely be affected.

TRANSPORTATION

More Project Area employment also would mean more travel at certain locations and intersections. Effects on local travel would depend on whether the additional employment was concentrated in one or two buildings or blocks, or spread out over the area designated for S/LI/RD development, and the amount of space that would be occupied by office activities.

Parking deficits would increase with the addition of office use in S/LI/RD space, because office use generates an excess parking demand (and therefore parking deficits). The effect would be compounded by the reduction of S/LI/RD space, which generates an excess of parking supply relative to demand.

Alternative A

Using the example presented on p. VII.42, if one-half of the S/LI/RD development in Alternative A were occupied by office activity, the increased employment would generate a corresponding increase in p.m. peak travel demand leaving the Project Area (about 18% more from S/LI/RD areas and about 6% more from the entire Project Area). Effects on intersections near the S/LI/RD areas could be noticeably different from those identified in VI.E. Transportation, if the additional employment were concentrated in a small area, especially along the Third Street corridor where a Level of Service (LOS) E is projected at the Third/Mariposa Street intersection. If it were spread over the area designated for S/LI/RD development, the differences would be less noticeable and perhaps, there would be no significant differences, depending on the amount of S/LI/RD development that would be accommodating office employment.

Alternative B

Using the example presented on p. VII.43, if one-half of the S/LI/RD development in Alternative B were occupied by office activity, the increased employment would generate a corresponding increase in p.m. peak travel demand leaving the Project Area (about 22% more from the S/LI/RD area and about 3% more from the Project Area). Since the S/LI/RD uses would be concentrated in the southeast corner of the Project Area, effects on intersections would be limited to the Third/Mariposa Street intersection. Project Area traffic would contribute 5% of the total p.m. peak-hour traffic through this intersection under Alternative B. The increase in traffic generated by office activity in the S/LI/RD area would not change the projected LOS D at this intersection.

The cumulative transportation analyses for Alternatives A and B would not change significantly if office were allowed as a primary use in S/LI/RD development. The conclusions in VI.E. Transportation about screenline travel and the implications for various systems would still apply.

AIR QUALITY, NOISE, ENERGY

Additional travel would produce air quality emissions proportionate to the increase in employee travel. Traffic noise could also increase, but the increase would not be noticeable. Transportation energy consumption would also increase proportionately.

GROWTH INDUCEMENT

Since the larger amount of employment in the Project Area as a consequence of allowing office as a primary use in S/LI/RD development would be employment that otherwise would be located elsewhere in San Francisco, the change in the S/LI/RD designation represented by this variant would not result in further additions to citywide employment growth or to associated population growth when compared to Alternatives A and B. As in Variant 5, there would be relatively less pressure for growth and change in Nearby Areas due to office development (particularly in South of Market and Civic Center / South Van Ness areas) and relatively more pressure due to S/LI/RD development (particularly South of Market and in the closer-in parts of older industrial areas west and south of the Project Area).

OTHER TOPICS

Other environmental effects of this variant would be the same as those of Alternative A or B, as appropriate (see VI.A. Public Plans, Policies, and Permits, starting on p. VI.A.34; VI.I. Architectural Resources and Urban Design, starting on p. VI.I.24; VI.J. Cultural Resources, starting on p. VI.J.14; VI.K. Geology and Seismicity, starting on p. VI.K.19 VI.L. Hydrology and Water Quality, starting on p. VI.L.13; VI.M. Vegetation and Wildlife, starting on p. VI.M.7, and VI.N. Hazardous Wastes, starting on p. VI.N.18).

8. VARIATIONS IN THE PERCENTAGE OF AFFORDABLE HOUSING AND THE SIZE OF AFFORDABLE UNITS (ALTERNATIVES A AND B)

The analysis in the EIR assumes that 30% of the new housing units in Alternatives A and B would be "affordable" in accordance with the Mayor's Letter with an average size of 850 square feet./4/ This section addresses implications of variations in that percentage, assuming the same total number of units in each Alternative. This section also considers the implications of changes in the sizes of affordable units such that more larger units and fewer smaller units are built, and the overall average unit size for affordable housing is larger. Each of these variations is discussed under the topics that follow.

DIFFERENCES IN PROJECT AREA POPULATION AT BUILD-OUT/2020

The amount of affordable housing in Mission Bay could have some effect on the total number of Project Area residents since the affordable units are assumed to have more people per unit than the other housing. Assuming the same total number of housing units in the Project Area and the same mix of unit sizes, variations in the percentage of affordable housing would make only small differences in total Project Area population, however. For example, increasing the percentage of units that are affordable from 30% to 35% could result in about 1% more people in the Project Area in Alternatives A and B, assuming the same mix of unit sizes and the same persons-per-household factors continued to apply. That difference could represent about 180 more people added to the population estimate of 14,400 for Alternative A at build-out and about 230 more people added to the population estimate of 18,670 for Alternative B at build-out.

The mix of sizes of affordable units also could affect Project Area population. More larger units (those with two, three and four bedrooms) and fewer smaller units (studios and one-bedroom units) could result in a larger total population in Mission Bay. For example, a change in the mix of sizes of affordable units resulting in an overall average unit size for the affordable housing that was 10% larger than assumed in Alternatives A and B could result in about 10% more people in the affordable units (assuming the same persons-per-household factors for units of various sizes). This larger number of people in affordable housing would represent about 3.5% more total Project Area population in Alternatives A and B. For Alternative A at build-out, an overall average unit size for affordable housing that was 10% larger could result in about 500 more people added to the total population estimate of 14,400 for that Alternative. For Alternative B at build-out, that increase in unit size could result in about 650 more people added to the total population estimate of 18,670 for that Alternative. If increases in the percentage of affordable housing were combined with changes resulting in more larger units, the Project Area population would be slightly larger than described above.

HOUSING AND POPULATION

Implications for the Characteristics of Households and Population

Since affordable units would have relatively low prices and rents, the more affordable units built, the more Project Area households there would be with relatively low incomes. Compared to the situations assumed for Alternatives A and B, more affordable units also could mean relatively more children and elderly residents. In general, however, the Mission Bay residential neighborhood would accommodate a broad range of different households and people under any variations in the amount of affordable housing provided. (See VI.C. Housing and Population, pp. VI.C.64-VI.C.67.)

Changes in the sizes of affordable housing units resulting in more larger units and fewer smaller units could mean more families with children residing in Mission Bay and fewer households of only adults, particularly elderly adults. Thus, much of the increase in population that could occur with larger units would represent additional children in affordable housing in the Project Area. There could be some more adults, with relatively fewer elderly individuals and relatively more younger adults. Overall, Project Area population could be relatively younger.

Implications for the Project Area Jobs/Housing Relationship and for the City's Housing Market

Implications of Increases in the Percentage of Affordable Housing

Affordable housing in the Project Area helps to accommodate households of those working in the Project Area as well as to satisfy other housing demand (from households with persons working elsewhere in the City and region as well as households without workers). The relationship between Project Area employment growth and housing development in Alternatives A and B is described in VI.C. Housing and Population, see pp. VI.C.70–VI.C.76. The following discussion uses that analysis of the match between Mission Bay housing and households with Project Area workers (under the assumption that 30% of the units would be affordable) to examine the potential increases in the percentage and number of affordable units, and how variations would affect the conclusions of the jobs/housing analysis for Alternatives A and B. No changes in the range of prices and rents for the affordable housing are assumed.

The amount of affordable housing in the Project Area also has implications for citywide housing market conditions. In general, the more affordable housing added in San Francisco, the more positive the contribution to the City's housing market since such units are difficult to produce and will continue to be in strong demand.

Alternative A. Alternative A would add a large amount of affordable new housing in the City (assuming 30% affordable units). For that Alternative, the number of additional San Francisco households with Project Area workers requiring affordable housing is estimated to represent about 36% of the new housing in Alternative A instead of 30% (see p. VI.C.74). Thus, if the percentage of affordable housing were higher than 30%, that would improve the ability of Project Area housing to accommodate Project Area employment growth. If it were higher than 36%, it would improve the ability of Project Area housing to accommodate other demand for affordable housing in the City (besides that associated with Project Area employment growth).

Increases in the 30% affordability assumption would not affect Alternative A's ability to meet the OAHPP requirements, because the percentage of units required to satisfy OAHPP is less than 30% (see p. VI.C.70).

Alternative B. Alternative B includes a large amount of housing relative to job growth in the Project Area. The percentage of total units required to satisfy OAHPP requirements for affordable housing (2.4%) and the percentage of units represented by the additional households with Project Area workers requiring affordable housing (about 6%) are low. Thus, variations in the 30% affordable housing assumption would not affect the ability of Project Area housing to accommodate Project Area employment growth. Variations would affect the amount of affordable housing available to satisfy other housing demand in the City (besides that from Project Area employment growth).

Implications of Increases in the Sizes of Affordable Units

The mix of sizes of affordable housing in Mission Bay, and thus, the types of households accommodated in the Project Area, could have implications for housing in other parts of the City. Generally, the more larger affordable units built and the more larger households (particularly family households) accommodated in Mission Bay, the less competition there could be for other larger units elsewhere in the City. However, more larger units could mean fewer smaller units, fewer smaller households (particularly elderly households) accommodated in Mission Bay, and more competition for other smaller housing units in other neighborhoods of the City. To the extent that it is most difficult to produce affordable family housing, the production of more larger units could accommodate those households whose options for family housing in San Francisco would be very limited without this production. This discussion of the effects of increasing the sizes of affordable housing units would apply under both Alternatives A and B.

COMMUNITY SERVICES

Any change in population would result in a proportionate increase or decrease in demands for community services. Special populations such as the elderly or school-age children would have differing demands for services such as public health services and schools.

ARCHITECTURAL RESOURCES AND URBAN DESIGN

Maximum build-out within permitted zoning envelopes was considered as a worst-case assumption for Alternatives A and B. It would be possible to accommodate some larger affordable units within the building envelopes analyzed for Alternatives A and B (see VI.I. Architectural Resources and Urban Design, p. VI.I.24). Although building heights and/or land coverage could be affected by this variant, the necessary design changes to Alternatives A and B would be small, and the discussion on pp. VI.I.37-VI.I.51 would apply to this variant.

GROWTH INDUCEMENT

These variations (a higher percentage of affordable units and larger affordable units in Mission Bay) could result in somewhat more population growth in the City. The difference in total population for either Alternative A or B would be relatively small, however. Consequently, the growth inducement aspects described on pp. VI.O.1-VI.O.9 would apply for this variation as well.

OTHER TOPICS

Other environmental effects of this variant would be similar to those of Alternative A or B, as appropriate (see VI.A. Public Plans, Policies, and Permits, starting on p. VI.A.34; VI.B. Land Use, Business Activity, and Employment, starting on p. VI.B.80; VI.E. Transportation, starting on p. VI.E.50; VI.F. Air Quality, starting on p. VI.F.11; VI.G. Noise, starting on p. VI.G.10; VI.H. Energy, starting on p. VI.H.7; VI.J. Cultural Resources, starting on p. VI.J.14; VI.K. Geology and Seismicity, starting on p. VI.K.19; VI.L. Hydrology and Water Quality, starting on p. VI.L.13; VI.M. Vegetation and Wildlife, starting on p. VI.M.7; and VI.N. Hazardous Wastes, starting on p. VI.N.18).

9. CALTRAIN STATION LOCATION (ALTERNATIVES A AND B)

The transportation impacts of the Mission Bay Alternatives presented in VI.E. Transportation and the related mitigation measures were identified on the basis of the CalTrain terminal locations assumed for the EIR Alternatives as described in Chapter V. The EIR Alternatives and Approval Process, p. V.7./6/ The key assumptions for that impact analysis are as follows:

- The CalTrain service would not be extended into downtown San Francisco.
- The San Francisco terminal for CalTrain would be relocated to Seventh and Channel Streets with Alternatives A and B.
- The San Francisco terminal for CalTrain would remain at its present above-ground site with Alternative N.

In this variant, the impacts of not relocating the CalTrain terminal to Seventh and Channel Streets under Alternatives A and B are discussed.

In order to retain the land use programs of Alternatives A and B together with the CalTrain terminal at Fourth Street, construction of a subway for CalTrain from approximately 16th Street north and east to an underground station at Fourth and King Streets would be required. King Street, rather than Townsend Street, would be the site of the underground station, as that location is compatible with convenient passenger transfer from a stop on the proposed MUNI Metro line on King Street, and is a location for which an easement could be provided. Optimally, construction of the subway should occur prior to SFP's development of the blocks north of China Basin Channel and west of Fifth Street, and before the new I-280 ramps are built, King Boulevard is upgraded, and the MUNI Metro line is extended, in order to reduce construction costs and avoid traffic disruption.

If the underground Fourth and King Streets station remained the San Francisco terminus for CalTrain, then the impacts presented for 2000 and build-out/2020 in VI.E. Transportation, for Alternatives A and B would change as follows:

- CalTrain's future ridership could be up to about 22% higher; ridership on BART (West Bay) and SamTrans would be about 9% and 11% lower, respectively, than the forecasts for the South Bay screenline presented in Tables VI.E.14–VI.E.20 pp. VI.E.106–VI.E.109, VI.E.115– VI.E.122, and p. VI.E.130. The percentages of outbound person trips by mode from the Downtown & Vicinity would be identical for Alternatives A and B with those shown for Alternative N in Table VI.E.7, p. VI.E.77. As a result, future levels of service would be as listed in Table VII.1.

  All three transit operators would continue to operate at comfortable to excellent levels of service, with no significant differences projected from the original forecasts.

- Vehicle volumes on Highway 101 and I-280 at the South Bay screenline in 2000 and 2020 would be about 5% less than the volumes presented in Table VI.E.15, p. VI.E.108. For U.S. 101, this would not result in any substantial change in the duration of congestion (about 2.5 hours in 2000, about 3.3 hours in 2020) or operating Levels of Service during the afternoon commute period.

- MUNI bus routes which would continue to serve the CalTrain Station at Fourth and King Streets, might not be extended to Seventh and Channel Streets, but could be extended past Fourth and King Streets through the Project Area on different alignments. The 30-Stockton could still be extended through the Project Area to eastern Potrero Hill, but along a more easterly routing. From the CalTrain Station at Fourth and King Streets, MUNI Metro rail tracks for storage would extend 1,000 feet west to about Fifth and King Streets. MUNI Metro could be extended west to the Showplace Square Area or south into the Project Area across the Owens Street Bridge.

TABLE VII.1: LEVELS OF TRANSIT SERVICE WITH NO CALTRAIN TERMINAL RELOCATION

	CalTrain		BART		SamTrans	
	D/C/a/	LOS/b/	D/C	LOS	D/C	LOS
	P.M. Peak Period					
2000						
Alternatives A and B	0.63	B	0.80	B	0.59	B
2020						
Alternative A	0.76	C	0.85	C	0.66	B
Alternative B	0.71	B	0.71	B	0.61	B
	P.M. Peak Period					
2000						
Alternatives A and B	0.65	B	0.66	B	0.50	B
2020						
Alternative A	0.77	C	0.73	B	0.59	B
Alternative B	0.71	B	0.71	B	0.54	B

/a/ Demand to capacity ratio (D/C) equals passengers per seat provided. For consistency of this analysis, the unit of seats has been used to define capacity (see p. XIV.E.16 for more discussion). Capacity for 2020 is assumed to be the same as that projected for 2000.

/b/ Level of Service, as defined in Transportation Research Board, Circular 212.

SOURCE: Environmental Science Associates, Inc.

- The peak pedestrian concentration would not be at Seventh and Channel Streets, but would remain as it is now with pedestrian travel from downtown north of Fourth and Townsend Streets. The number of pedestrians arriving at the CalTrain terminal, including those alighting from MUNI vehicles, would be about 22% higher than with the terminal at Seventh and Channel.

An underground station at Fourth and King Streets could serve as a temporary terminal if CalTrain service was extended into downtown. In that case, the impacts would be identical to those described above, because this would continue to be be the major transfer point between MUNI and CalTrain until the extension into the downtown was completed.

Once the CalTrain extension into downtown was completed, the function of the Mission Bay station would change, as this would be a way station serving primarily Mission Bay, Showplace Square South of Market and South Beach travelers. Requirements for MUNI bus and Metro capacity would be lower than if the Fourth and King Street Station were to remain CalTrain's terminus. Pedestrian volumes during peak periods would also be correspondingly lower on sidewalks and at crosswalks directly adjacent to or leading to Fourth and King Streets.

In June 1988, the voters of San Mateo County approved a sales tax increase to be used for transportation improvements. This ballot measure would generate $200 million toward the extension of CalTrain to downtown, about half the total estimated cost. Detailed analysis of the impacts of the CalTrain extension would be prepared for that project when the extension secures its full required funding commitment. This summary presents only the variations in impacts that would occur with this variation of the baseline description of EIR Alternatives A and B.

10. REDUCED SEISMIC HAZARD (ALTERNATIVES A, B, AND N)

Most of Mission Bay is former bayland or marsh. Those areas are subject to liquefaction and "violent" groundshaking in the event of a great earthquake (see VI.K. Geology and Seismicity, pp. VI.K.33-VI.K.37). A seismically safe variant to the Mission Bay Alternatives would limit development to those areas estimated to undergo only "very strong" groundshaking. Commercial and residential development that would otherwise occur in Mission Bay would thus be directed to other, seismically safer locations in the City and the region, limiting the number of employees and residents exposed to seismic hazard. There are no locations in Mission Bay where maximum groundshaking would be "strong" or less intense. If policy were established to permit new development only in areas experiencing "strong" or "weak" groundshaking, no new development could occur in Mission Bay or much of San Francisco.

There are two areas of "very strong" groundshaking, where bedrock is near the surface, in the Project Area. Development in these areas would be limited to: 1) the northeastern corner of the Project Area, near Townsend Street west of Third; and 2) the southwestern corner south of 16th Street along I-80. It is assumed that office development would occur on the northeastern parcel (as in Alternatives A and N), and that M-2 Industrial or S/LI/RD uses would occur on the southwestern parcel (as in Alternatives A and N). The rest of the Mission Bay Project Area would either remain in rail yards and low-intensity warehousing and trucking industry uses or could become vacant as rail uses were removed. The environmental effects of this variant would be similar to those described for Alternatives A and N for the northeastern and southwestern corners of the Project Area. There would be no new adverse environmental effects in other portions of the Project Area, and conditions would remain as they are described in the Setting sections of Chapter VI. Environmental Setting, Impact and Mitigation. The area would remain underused, and contaminated soils likely in certain portions of the area would remain.

A plan that would severely limit development in the Mission Bay area and shift development to other areas of the City is unlikely. San Francisco has little vacant land that is not subject to very strong or violent groundshaking, and no other areas of potential development as large as the 325-acre Mission Bay area. It is not reasonable to redevelop large portions of areas such as the Richmond or Sunset Districts into the higher-intensity development described for the Mission Bay Alternatives, because those areas are essentially fully developed with housing and neighborhood-serving commercial uses. While some areas of the South Bayshore include areas that could be seismically "safer" than Mission Bay, they too are already developed, and provide some of the last remaining industrially zoned areas in the City.

The less vulnerable areas just north of the Mission Bay Project Area, such as Rincon Hill or portions of the eastern South of Market, are equally inappropriate to receive development proposed for Mission Bay. Rincon Hill recently has been rezoned and planned for high-intensity residential development, much of which is at least as dense as the residential areas proposed under Alternatives A and B. South of Market is presently under study, with proposals from both the City and members of that community generally supporting retention of this area for light industrial and entertainment uses, with office uses already proposed for the eastern end along Second Street.

San Francisco has no jurisdiction to direct growth to specific locations outside of its boundaries such as "seismically safer" areas of Marin or San Mateo Counties. Thus, implementing a seismic safety variant using this route would essentially establish the status quo, as described in the Setting sections of the EIR, as the limit of development in Mission Bay. Much of the demand for commercial and residential space would then be met elsewhere in the San Francisco Bay Area, as discussed in VI.B. Land Use, Business

Activity, and Employment, p. VI.B.119. There is no way to guarantee that this development would occur on seismically safer soils, however. Spreading development throughout the region has the potential for other impacts, such as transportation problems if less transit is available for commuting to work than in the Downtown & Vicinity.

Proposing a plan that included development of industrial uses in most of the Project Area would essentially duplicate the M-2 District development assumed under Alternative N. Because that Alternative shows an employed population of about 17,000, only 6,000 of whom might be accommodated in the slightly more "safe" area of Townsend and Third, even this Alternative could be said to expose large numbers of people to seismic hazard. (While it would be technically possible to develop parklands in the most seismically active areas of Mission Bay, that development is not likely to be economically feasible due to the limited amount of developable land elsewhere in the area that would be available to support park development, and due to the expense of cleaning up contaminated soils likely to be found in portions of the area.)

Mitigation measures identified for Alternatives A, B, and N (see VI.K. Geology and Seismicity, pp. VI.K.45-VI.K.56) would substantially reduce the seismic hazards associated with building construction in the Project Area. Those mitigation measures would require more stringent standards than are now required in the San Francisco Building Code. Thus, structures in Mission Bay could be more seismically sound the structures built concurrently in other portions of the City. In addition, the Bureau of Building Inspection expects to propose to the Board of Supervisors in 1989 revisions to the San Francisco Building Code, which would reflect seismic updated standards in the 1988 Uniform Building Code./6/ Thus, while a seismically safer variant would expose fewer people to seismic hazards in Mission Bay, it is likely that development elsewhere would expose them to similar hazards. Hazards in Mission Bay would be reduced by the seismic requirements of the San Francisco Building Code, possibly augmented by mitigation measures for Mission Bay if they were adopted.

NOTES - Variations on Alternatives

/1/ To the extent that building the remaining blocks to greater density would increase M-2 space construction costs and decrease parking and delivery vehicle access, some businesses may find locations outside the Project Area to be relatively more attractive than M-2 space in the Project Area. In that case, it is possible that the remaining M-2 blocks west of Third Street would absorb somewhat less than the full amount of M-2 space replaced by housing; impacts would be proportionally less.

/2/ Chapter VI.E. Transportation contains an extensive discussion of travel demand forecasting for the Project Area, Downtown and Vicinity, and the rest of the region, and the effects of this projected travel demand on operating conditions at screenlines (highways and transit), local intersections and on MUNI routes serving the Project Area. For highways at the regional screenlines, at build-out, (pp. VI.E.106-VI.E.109) small numerical differences in outbound traffic during the p.m. peak period and hour among Alternatives A, B and N do not produce significantly different impacts in terms of the duration of congestion. For transit systems (pp. VI.E.115-VI.E.112), cumulative transit ridership at screenlines is forecast not to be different among Alternatives A, B and N, except for the South Bay screenline. A significantly higher CalTrain ridership under Alternative N than under Alternative A or B could be caused by the relocation of the San Francisco CalTrain terminus further from the downtown employment center with the latter Alternatives. As shown in Table VI.E.20 (p. VI.E.130), however, there would be no significant differences in cumulative outbound transit levels of service during the p.m. peak period and hour among the Alternatives. For local intersections (pp. VI.E.166-VI.E.175), very few differences exist among Alternatives A, B and N for 2020 Levels of Service (Table VI.E.26, pp. VI.E.167-VI.E.168), and these few differences are too small to be considered significant. For MUNI routes serving the Project Area, 2020 Levels of Service (Table VI.E.27, p. VI.E.177) with Alternative B would be worse than with Alternatives A or N, as the larger number of residents in Alternative B would generate more southbound (peak direction) p.m. peak-period trips than would the other Alternatives.

/3/ Office employment in lower-rise S/LI/RD space is estimated assuming 300 square feet per employee. This is a somewhat lower density (more space per worker) than that assumed for the major office development in Mission Bay (275 square feet per employee). The office density for this variant reflects higher employment density (less space per worker) than the average densities (405 square feet per employee and 465 square feet per employee, respectively) assumed for S/LI/RD activities in Alternatives A and B. Employment densities are presented in Appendix A. The EIR Alternatives, Table XIV.A.2, p. XIV.A.10. The density factors apply per gross square foot of occupied space after accounting for a 5% vacancy.

/4/ For the purposes of the EIR analysis, affordable housing units were defined according to the terms of the Mayor's Letter to Southern Pacific: prices would range from $105,000 to $150,000, with an average price of $125,000 in 1984 dollars. There also would be units available at comparable affordable rents.

/5/ In addition to the discussion of the CalTrain station in this chapter and in VI.E. Transportation, see "CalTrain Station Locations," Special Study for Mission Bay, prepared by Barton-Aschman Associates for the San Francisco Department of City Planning, September 1986, and the DKS Study "Patronage Effects of the CalTrain Station Relocation," November 1986.

/6/ Franklin Lew, Manager of Special Projects Unit, San Francisco Department of Public Works, telephone conversation, July 15, 1988.

VIII. SIGNIFICANT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF THE PROPOSED PROJECT IS IMPLEMENTED

This chapter lists those significant impacts that would result from approval of one of the Alternatives or a variant of the Alternatives and that could not be mitigated by changes or additions to the project. This EIR cannot list with specificity the impacts that would result from approval of a particular Alternative or variant because it is too early in the process to predict whether any of the available mitigation measures would be included in a development project either by the project sponsor, Santa Fe Pacific, or by the City. A listing of the specific impacts that are not mitigated will be part of the decision making documents.

The significant impacts that follow are those for which mitigation measures are either not available or would not mitigate to a level of insignificance. Thus, for example, Alternative A could cause significant effects on Pacific herring populations if dredging in the Channel were to occur during the spawning season as described on pp. VI.M.14. However, that impact is not listed below because a mitigation measure prohibiting dredging or dredge disposal during the spawning season in any of the spawning areas is available (see p. 25) that would reduce the impact to acceptable levels.

Alternative	Effect
A,B	Alternatives A and B would change the principal types of land uses in the Project Area. Housing, office, and retail uses would replace existing railroad, industrial, warehousing, and transportation uses and vacant land.
A,B	Housing and other non-maritime uses east of Third Street under Alternatives A and B would preclude development of a major container terminal on piers adjacent to the Project Area, and would result in insufficient backland area for new marine terminal facilities. The area between Piers 70 and 80 has been proposed as an alternate site for marine terminal facilities. Unless this exchange or a similar arrangement is determined to be consistent with meeting container handling capacity needs forecasted for the

Alternative	Effect
	region in the San Francisco Bay Area Seaport Plan, precluding container terminal opportunities next to the Project Area has been identified as an unavoidable significant impact.
A,B,N	Increased housing under Alternatives A and B and employment under all Alternatives would result in increased use of all transportation systems. Mitigation measures are available that would reduce some otherwise significant transportation effects. However, all Alternatives would contribute to unavoidable significant cumulative traffic impacts in 2000 and 2020 that would result in expanded congestion on the regional freeway system. Most of the increases in regional cumulative traffic would come from regional origins and destinations (that is, trips neither originating nor ending in the Downtown & Vicinity, including Mission Bay). Mitigation measures for long-range future reduction in freeway and transit congestion are discussed at two levels: – increases in service capacity on the existing transportation network (for 2000); and – identification of the types of infrastructure improvements on the regional transportation system that would accommodate the majority of San Francisco travel demand (for 2020). Although those mitigation measure are identified, contribution of the Mission Bay Alternatives to expanded cumulative traffic congestion is included as an unavoidable significant effect. That is because many of those measures would require regional, state, and federal-level approvals, and implementation over a long period that exceeds the planning horizons addressed in most regional transportation planning. In response to projected highway congestion, Downtown & Vicinity trips (including Project Area trips) are assumed in the analysis in this EIR to shift from single-occupant autos to ridesharing and

Alternative	Effect
	transit in percentages well beyond the existing modal shares of the latter two modes. The shifts to transit would place a major burden on regional systems.
	Additions from the Project Area (and Downtown & Vicinity) to cumulative traffic increases on local streets would be mitigated by planned and suggested improvements to intersections and nearby freeway ramps. However, those improvements also would add traffic to intersections in and near the Project Area, and not all intersection and freeway ramps could be improved to acceptable levels of service. Thus, cumulative travel from the Project Area and Downtown & Vicinity would contribute to unacceptable levels of service at some intersections.
A,B,N	The additional development projected to occur with all Alternatives would result in increased travel to and from San Francisco, contributing to cumulative vehicle emissions within the Air Basin. Those emissions would incrementally increase the frequency of violations of air quality standards for particulate matter (PM_{10}) and for ozone during periods of poor ventilation, with concomitant health effects and reduced visibility.
	Emissions of air pollutants from Project Area travel would also exceed 1% of countywide emissions. The 1% level is a threshold used by BAAQMD to identify "significant" increases in air emissions. For all Alternatives, carbon monoxide, hydrocarbon and nitrogen oxide emissions would exceed the 1% threshold.
A,B,N	All Alternatives would have a significant seismic safety impact, as they would accommodate a higher residential and / or employment population that would be subject to substantial danger during a major earthquake. If stringent building standards are adopted for new construction, as described in VI.K. Geology and Seismicity:

Alternative	Effect
	Mitigation, measures K.9-K.11, pp. VI.K.47-VI.K.48, the Alternatives would be as safe or safer than other areas in San Francisco, thereby reducing risk. However, greater concentrations of people would be susceptible to injury and would create congestion, which, along with debris in the streets, would impede the access of emergency vehicles responding to fire and other earthquake-related emergencies. Implications of this seismic impact are described in VI.K. Geology and Seismicity, p. VI.K.33.
A	Dredging in China Basin Channel and disposal of the material at either an ocean or Bay (likely to be Alcatraz) disposal site could cause unavoidable potentially significant impacts in the channel and at the disposal site. Based on data presently available on the levels of contaminants in channel sediments, dredging of spoils would release contaminants into the water column in the channel and at the disposal site. Although contaminant concentrations would be reduced after initial mixing, it is not possible to determine whether water quality objectives and criteria would be met because of a lack of more recent chemistry and toxicity data on channel sediments. Thus, if the sediments contained contaminants that violated public health standards or ecological effects thresholds, dredging would cause temporary but unavoidable significant effects on water quality and biologic resources in the channel. Within one year before filing dredging permit applications with the U.S. Army Corps of Engineers, detailed tests would be required to determine the nature and reactivity of channel sediments. If it is determined that the sediments violate standards or thresholds for contaminants, Bay or ocean disposal would be prohibited; land disposal would instead be required as a condition to issuing permits, thus avoiding water quality impacts in the Bay or ocean. Results would be disclosed in public notices of the applications, and there would be an opportunity for a public hearing before issuance of final permits for any dredging and disposal.

IX. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Alternative	Relationship
A,B	Approval of these or similar Alternatives would change and intensify land uses in the Project Area. Approval of these land use changes in the near future would preclude other uses that later might be found desirable.
N	Retention of existing zoning districts and Master Plan provisions covering the Project Area, as in Alternative N, would permit later choices for other uses in the near term. If existing controls were retained for a long period, development as described for this Alternative would probably preclude major changes in use as contained in Alternatives A or B.
B	Construction of wetlands would preclude other uses such as residential, commercial or port-related maritime uses in the long term, unless the flooded areas were refilled and the wildlife habitats were returned to urban, developed land.
A,B,N	All Alternatives would include treatment or removal and disposal of hazardous materials that may be present in the Project Area from previous industrial and commercial uses, in compliance with applicable local and state regulations. This would enhance the long-term environmental safety of the Project Area. Alternatives A and B, as master-planned Alternatives, would implement a comprehensive Mitigation Plan for cleanup of hazardous materials; cleanup under Alternative N would be likely to proceed on an incremental site-by-site basis as developments are proposed.

X. SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Alternative	Change
A,B,N	All Alternatives would commit the Project Area to more-intense urban uses, compared to existing vacant railroad, industrial, warehousing, and transportation uses, and vacant land.
A,B	Alternatives A and B would preclude long-term development of major container terminal uses east of Third Street at Piers 48 to 50. Alternatives A and B would not provide sufficient backland area for new terminal facilities. While capital improvements to improve existing container-handling facilities at Piers 80 to 96 are planned, those improvements would not replace entirely the designation of the Piers 48 to 50 area as a near-term site for marine terminal facilities.
A,B,N	Construction materials and energy used for all Alternatives would involve use of some nonrenewable resources. Continued development would also result in continuing increases in automobile and transit trips. The additional trips, plus construction activities from new development, would contribute to future cumulative air quality impacts from increases in particulate matter, CO and ozone precursor emissions.
A,B,N	All Alternatives would be in an area subject to substantial seismic hazard, similar to other areas of the City underlain by fill. Development of more businesses and residences in the area would increase the employee and resident population, resulting in exposure of larger numbers of people to death and injury in the event of a major earthquake in the Bay Area. If the stringent building standards of the 1988 Uniform Building Code were adopted for new construction, the Alternatives would be as safe as or safer than other areas in San Francisco.

XI. REPORT AUTHORS AND PERSONS CONSULTED

REPORT AUTHORS

EIR AUTHORS

San Francisco Department of City Planning
450 McAllister Street, 4th Floor
San Francisco, CA 94102
Barbara W. Sahm, Environmental Review Officer
Diane Oshima, Mission Bay EIR Coordinator

PROJECT SPONSOR AND PROJECT CONSULTANTS

Santa Fe Pacific Realty Corporation
201 Mission Street, Suite 250
San Francisco, CA 94105
James W. Augustino, Project Director
Kerstin Fraser Magary, Manager Special Projects
P.D. Marini, Project Manager
Prem Chaudhri, Property Manager

Coblentz, Cahen, McCabe & Breyer
One Embarcadero Center, 35th Floor
San Francisco, CA 94111
Pamela S. Duffy, Esq.
Susan J. Passovoy, Esq.

DKS Associates
1956 Webster Street, Suite 300
Oakland, CA 94612
Daniel T. Smith, Principal

Dames & Moore
221 Main Street, Suite 600
San Francisco, CA 94105
Robert Darragh

Jefferson Associates, Inc.
683 McAllister Street
San Francisco, CA 94102
James Jefferson
Gordon Jacoby
Avonee Smith

PROJECT SPONSOR AND PROJECT CONSULTANTS (Cont.)

KCA Engineers
318 Brannan Street
San Francisco, CA 94103
Robert W. Barton, President

Nossman, Guthner, Knox & Elliot
100 The Embarcadero, Third Floor
San Francisco, CA 94105-1295
Michael Wilmar, Esq.

Ticor Title Insurance
Underwriting Practices
160 Pine Street
San Francisco, CA 94111
MaryPat Noeker, Administrative Assistant

EIR CONSULTANTS

Environmental Science Associates, Inc.
ESA/Planning and Environmental Services
(Prime Consultant)
760 Harrison Street
San Francisco, CA 94107
Richard Cole, Ph.D.: Associate-in-Charge
Nancy Cunningham Clark: EIR Project Manager
James C. Banks, Jr., Diane Scholz, Keith Kjelstrom: Assistant Project Managers
Bruce Campbell: Task Leader (Energy, Noise, Air Quality, Hazardous Materials)
    James C. Banks, Jr.
    Kristian Macoskey
    Jefferson Wehling
    Max G. Rodel
Michael Rice: Task Leader (Public Plans, Policies and Permits, Community Services and Infrastructure, Cultural Resources, Architectural Resources and Urban Design)
    Glen E. Elder, Ph.D.
    Diane Scholz
    Charles B. Bennett

EIR CONSULTANTS (Cont.)

Environmental Science Associates, Inc. (Cont'd)

Mark F. Winsor, Ph.D.: Task Leader
(Geology and Seismicity, Hydrology and Water Quality, Vegetation and Wildlife)
Sandra Guldman
Gary W. Oates
Gregg B. Miller
Katherine Cuneo, Ph.D.
James C. Banks, Jr.: Task Leader
(Highlights & Conclusions)
Cheryl Fowler, Georgette Simmonds: Lead Word Processors
Robert Suhr, Valerie Reichert, Lisa Crossett: Lead Graphic Artists

Barton-Aschman Associates
(Transportation)
100 Park Center Plaza, Suite 450
San Jose, CA 95113
Norman Steinman
Frederick C. Dock
David Fairchild
Robert Eckols

Baseline Environmental Consulting
(Air Quality)
315 Washington Street
Oakland, CA 94607
Irene Kan

Roger Owen Boyer and Associates
(Architectural Resources and Urban Design)
351 California Street, Suite 401
San Francisco, CA 94104
Roger Owen Boyer

David Chavez & Associates
(Cultural and Historic Resources)
P.O. Box 52
Mill Valley, CA 94941
David Chavez

Geotechnical Consultants, Inc.
111 New Montgomery Street
San Francisco, CA 94105
Joseph Gonzalez
Susan Wickham

EIR CONSULTANTS (Cont.)

Professor Scott Lynn, Ph.D.
Department of Chemical Engineering
University of California Berkeley
201 Gilman Hall
Berkeley, CA 94720

Recht Hausrath & Associates
(Land Use, Business Activity and Employment, Housing and Population, Growth Inducement)
1212 Broadway, Suite 1700
Oakland, CA 94612
Linda Hausrath
Sally Nielsen
Mary Catherine Haug-Boone

E.M. Rose & Associates
(Libraries and Solid Waste)
435 Bryant Street
San Francisco, CA 94107
Edward M. Rose

PERSONS CONSULTED

CITY AND COUNTY OF SAN FRANCISCO

Department of City Planning
450 McAllister Street
San Francisco, CA 94102
Dean L. Macris, Director of Planning
George A. Williams, Assistant Director, Plans and Programs
Alec S. Bash, Mission Bay Project Director
Rana Ahmadi
Eugene Coleman, Mission Bay Community Coordinator
Lilia Medina, Mission Bay Planner
Amit Ghosh
Peter Groat
Richard Hedman
Roger Herrera
Jonathan Hussey
Rebecca Kohlstrand
Peter LaBrie, Jr.
Andrea McKenzie
Jonathan Malone
Sally Maxwell
Susana Montana
Robert W. Passmore, Assistant Director, Implementation
Lois Scott

CITY AND COUNTY OF SAN FRANCISCO (Cont'd)

Department of City Planning (Cont'd)
Chi Hsin Shao
Steven Shotland

Office of the Mayor
City Hall
San Francisco, CA 94102
Steven LaPlante, Special Coordinator for the Homeless

Office of the Chief Administrative Officer
City Hall
San Francisco, CA 94102
Rudolph Nothenburg, Chief Administrative Officer
Amy Perlmutter, Recycling Coordinator

City Attorney's Office
214 Van Ness Avenue
San Francisco, CA 94102
Noreen M. Ambrose, Deputy City Attorney
Christine Desser, Deputy City Attorney

Clean Water Program
770 Golden Gate Avenue
San Francisco, CA 94102
Daniel M. Champeau, Project Manager
J.M. DelaCruz, Division Chief
David Jones
Thomas Landers
Don Munakata, Project Manager
Arleen Navarret, Water Quality Chemist

Hetch Hetchy Water and Power Department
693 Vermont Street
San Francisco, CA 94107
Lawrence Kline, Deputy General Manager

San Francisco Redevelopment Agency
P.O. Box 646
San Francisco, CA 94101
Thomas G. Conrad, Director, Planning and Programming

CITY AND COUNTY OF SAN FRANCISCO (Cont'd)

San Francisco Public Library
Civic Center
San Francisco, CA 94102
John Frantz, Librarian (former)
Gladys Hansen, Librarian
Karen Scannell, Chief of Branches

San Francisco Department of Public Health
101 Grove Street
San Francisco, CA 94102
Donna D'Acuti, Emergency Medical Services Coordinator
Charles B. Darke, Dental Director
James T. Gilday, Health Program Planner
William L. Lee, Manager, Toxic Control
Aubrey Lewis, Senior Rodent Control Inspector
Les Lum, Senior Environmental Health Inspector
William McConnell, Director of Planning and Evaluation, Community Mental Health Services
Teresa Serata, Health Program Planner
Cynthia Woo, Fire Inspector

San Francisco Recreation and Park Department
McLaren Lodge, Golden Gate Park
San Francisco, CA 94117
Deborah Learner, Planner
Marilyn Duffey, Consultant
Ronald deLeon, Assistant Supervisor

San Francisco Fire Department
260 Golden Gate Avenue
San Francisco, CA 94102
Frank Blackburn, Assistant Chief
Gerald Cullen, Deputy Chief
James McDonagh, Fireman
Howard Slater, Assistant Chief
Oliver Storti, Assistant Chief

San Francisco Mayor's Office of Emergency Services
1111 Market Street, Second Floor
San Francisco, CA 94103
Thomas Jenkins, Acting Director

CITY AND COUNTY OF SAN FRANCISCO (Cont'd)

San Francisco Police Department
Planning and Research Division
850 Bryant Street
San Francisco, CA 94103
Thomas W. Suttmeier, Commanding Officer
Thomas Del Torre, Sergeant
Heather J. Fong, Officer
Harold Waterman, Senior Management Assistant
Steven Lutes, Planner

San Francisco Unified School District
801 Toland Street
San Francisco, CA 94124
Lawrence Jacobson, Property Manager

Department of Public Works
460 McAllister Street
San Francisco, CA 94102
Patrick Petersen, Station Engineer
Division of Streets and Highways
V. H. Tronan, Director
Joe Cheung
Tim A. Molinare, Division Engineer
Gordon M. Wong, Division Engineer
Bureau of Street and Sewer Repair
David Conci, Superintendent of Bridges and Tunnels
Bureau of Water Pollution Control
Jerry O'Brien, Project Manager
Steve Medberry
Special Projects Division
Franklin Lew, Manager

Port of San Francisco
Ferry Building
San Francisco, CA 94111
Louise Anderson, Traffic Analyst
Cliff Jarrard, Administrative Engineer
John Kellogg, Trade Development Manager
Philip Kern, Project Manager
Randall Rossi, Director of Planning
Henry Williams, Assistant Commercial Property Manager

CITY AND COUNTY OF SAN FRANCISCO (Cont'd)

San Francisco Water Department
1990 Newcomb Avenue
San Francisco, CA 94124
James D. Cooney, General Manager
Thomas Dickerman, Chief Division Engineer
Martin H. Lieberman, Manager, City Distribution
Robert Vasconcellos, Resources and Planning Manager

San Francisco Real Estate Department
25 Van Ness Avenue, Suite 400
San Francisco, CA 94102
Anthony DeLucci, Director
Robert M. Lavell, Senior Right-of-Way Agent
Matthew D. Ashe, Acting Assistant Director of Property
Wallace Wortman, Director of Property

San Francisco Municipal Railway
949 Presidio Avenue
San Francisco, CA
Peter Straus, Director of Service Planning
Luther Freeman, MUNI Strategic Planning

San Francisco Public Utilities Commission
City Hall, Room 287
San Francisco, CA 94102
Lee Knight, Planning and Development Division
Douglas Wright
John Deakin

CITY CONSULTANTS

EDAW, Inc.
1725 Montgomery Street
San Francisco, CA 94111
N. Teresa Rea

Gabriel-Roche, Inc.
10933 Cotter Street
Oakland, CA 94605
Janet Gabriel-Roche
Michael Fajans

CITY CONSULTANTS (Cont'd)

Robert L. Harrison
2370 Vista Del Mar Lane
Tiburon, CA 94920

Charles M. Salter Associates, Inc.
930 Montgomery Street
San Francisco, CA 94133
Richard Illingsworth

Shute, Mihaly & Weinberger
396 Hayes Street, Suite 1
San Francisco, CA 94102
Marc Mihaly, Esq.
Terry Watt

Philip Williams and Associates
Pier 33 North, The Embarcadero
San Francisco, CA 94111
Philip Williams, Principal

REGIONAL AGENCIES

Association of Bay Area Governments
P.O. Box 2050
Oakland, CA 94604
Raymond Brady, Manager, Analysis Group
Susan Hootkins, Senior Regional Planner

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
Richard Duker, Meteorologist
Dario Levaggi
Tirlochan Mangat, Manager
Irwin Mussen
Thomas E. Perardi, Manager
James S. Sandberg, Meteorologist
Jean Roggenkamp

Bay Conservation and Development Commission
30 Van Ness Avenue
San Francisco, CA 94102
Jeff Blanchfield, Director
Stephen McAdam, Assistant Director
Robert Batha, Environmental Planner
Joan L. Lundstrom, Permit Analyst

REGIONAL AGENCIES

Golden Gate Bridge, Highway and Transportation District
1011 Enderson Drive
San Rafael, CA 94901
Jerome M. Kuykendall, Director of Planning

Metropolitan Transportation Commission
101 Eighth Street
Oakland, CA 94604
Jeff Georgevich
Marc Rodin
Susan Hardy

San Francisco Regional Water Quality Control Board
1111 Jackson Street
Oakland, CA
Stephen Hill, Environmental Specialist

STATE OF CALIFORNIA

Department of Fish and Game
411 Burgess Drive
Menlo Park, CA 94025
Robert Tasto, Fisheries Biologist

Department of Health Services
714/744 P Street
P.O. Box 942732
Sacramento, CA 94234-7320
David Leu, Chief of Alternative Technology

Department of Transportation (Caltrans)
150 Oak Street
San Francisco, CA 94102
Linda Bohlinger
Joe Brown, Deputy District Director for Construction
George Gray, Deputy District Director for Planning and Public Transportation
Steven Mikesell
Robert S. Nielsen
Eric Schatmeier
Frank Tedesco, Branch Chief, Project Development

STATE OF CALIFORNIA

Employment Development Department
P.O. Box 7774
San Francisco, CA 94120
Camille Jordan

Natural Diversity Data Base
1416 9th Street, Room 1225
Sacramento, CA 95814
Rick York, Botany Research Assistant

Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
Tack Joe
William Well

State Lands Commission
1807 13th Street
Sacramento, CA 95814
Jane Sekelsky

FEDERAL AGENCIES

National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404
James Bybee, Environmental Coordinator

U.S. Coast Guard
Eleventh District
Bridge Section North
Building 10, Room 214
Coast Guard Island
Alameda, CA 94501
Steven Sandoval, Petty Officer
Rosa Guerra, Assistant Chief
Wayne R. Till, Chief

U.S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105
Frank M. Covington, Director, Water Management

U.S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825
Margaret A. Kohl, Fish and Wildlife Biologist

PERSONS AND ORGANIZATIONS

Applied Technology Council
3 Twin Dolphin Drive, Suite 275
Redwood City, CA 94065
Christopher Rojahn, Executive Director

Archeo-Tec, Inc.
955A Stannage Street
Albany, CA 94706
Alan Pastron

Associated General Contractors
1255 Post Street
San Francisco, CA 94109
Thomas Thompson

The Foundation for San Francisco's Architectural Heritage
2007 Franklin Street
San Francisco, CA 94109
Christopher H. Nelson, Architectural Historian

Golden Gate Disposal Company
900 Seventh Street
San Francisco, CA 94107
Fiore Garbarino, Treasurer

Nancy Olmsted
c/o Mission Creek Conservancy
300 Channel Street, #21
San Francisco, CA 94107

Pacific Gas and Electric Company
77 Beale Street
San Francisco, CA 94104
John C. Brisky
Edward Guerrero, Division Operator Supervisor
William Healy, Gas Plant Foreman
Gerald Tyson, Marketing Supervisor
Richard Van Ulden, Marketing Manager

Potrero Hill Neighborhood House
953 DeHaro
San Francisco, CA 94107
Enola Maxwell, Director

San Francisco Building and Construction Trades Council
400 Alabama Street
San Francisco, CA 94110
Stanley Smith, Secretary

PERSONS AND ORGANIZATIONS (Cont'd)

Seismic Investigation and Hazard Survey
Advisory Committee
City Hall, Room 266
San Francisco, CA 94102
Joseph Litehiser, Technical Chairman
John Elberling, Citizen Chairman

Sunset Scavenger Corporation
Tunnel Avenue & Beatty Road
Brisbane, CA
Louis F. Pitto, General Manager

Southern Pacific Transportation Company
One Market Plaza
San Francisco, CA 94105
Peter Rogers, Trainmaster (Brisbane)

Bruce White, Ph.D
3207 Shelter Cove
Davis, CA 95616

XII. DISTRIBUTION LIST

Parties below are the government agencies and libraries that received copies of the Mission Bay Draft EIR, or relevant portions thereof. The full list of parties receiving notice of the availability of the Draft EIR is available for public review at the Department of City Planning, Office of Environmental Review, 450 McAllister Street, Room 401, San Francisco.

CITY AND COUNTY OF SAN FRANCISCO

The Honorable Art Agnos
Office of the Mayor
City Hall
San Francisco, CA 94102

San Francisco City Planning Commission
450 McAllister Street
San Francisco, CA 94102
Attn: Lori Yamauchi
Susan J. Bierman, President
Robert S. Dick
Douglas Engmann
Wayne Jackson Hu
James B. Morales
Norman Karasick, Alternate
Romaine Baldridge, Alternate

Landmarks Preservation Advisory Board
450 McAllister Street
San Francisco, CA 94102
Attn: Jonathan H. Malone

Office of the Chief Administrative Officer
City Hall
San Francisco, CA 94102
Attn: Rudolph Nothenberg, Chief Administrative Officer

Office of the Chief Administrative Officer
City Hall
San Francisco, CA 94102
Attn: Amy Perlmutter, Recycling Coordinator

City Attorney's Office
214 Van Ness Avenue
San Francisco, CA 94102
Attn: Noreen M. Ambrose, Deputy City Attorney

CITY AND COUNTY OF SAN FRANCISCO (continued)

City Attorney's Office
214 Van Ness Avenue
San Francisco, CA 94102
Attn: Christine Desser, Deputy City Attorney

Clean Water Program
770 Golden Gate Avenue
San Francisco, CA 94102
Attn: Daniel M. Champeau, Project Manager

San Francisco Department of Public Works
Bureau of Engineering
Division of Streets and Highways
45 Hyde Street, Room 222
San Francisco, CA 94102
Attn: Tim A. Molinare

San Francisco Department of Public Works
Traffic Engineering Division
460 McAllister Street
San Francisco, CA 94102
Attn: Gordon Chester

Department of Public Works
Bureau of Water Pollution Control
750 Phelps Street
San Francisco, CA 94124
Attn: Steve Medberry

Department of Public Works
Special Projects Division
City Hall #266
San Francisco, CA 94102
Attn: Franklin Lew, Manager

CITY AND COUNTY OF SAN FRANCISCO
(continued)

San Francisco Fire Department
260 Golden Gate Avenue
San Francisco, CA 94102
Attn: Chief Howard Slater
Division of Planning and Research

San Francisco Municipal Railway
MUNI Planning Division
949 Presidio Avenue, Room 204
San Francisco, CA 94115
Attn: Peter Straus

San Francisco Municipal Railway
949 Presidio Avenue
San Francisco, CA
Attn: Luther Freeman, MUNI Strategic Planning

San Francisco Public Utilities Commission
425 Mason Street, 4th Floor
San Francisco, CA 94102
Attn: Douglas Wright

San Francisco Public Utilities Commission
Bureau of Energy Conservation
110 McAllister Street, Room 402
San Francisco, CA 94102
Attn: John Deakin, Director

Port of San Francisco
Ferry Building
San Francisco, CA 94111
Attn: Randall Rossi, Director of Planning

San Francisco Department of Public Health
101 Grove Street, #324
San Francisco, CA 94102
Attn: James T. Gilday, Health Program Planner

San Francisco Department of Public Health
101 Grove Street, #207
San Francisco, CA 94102
Attn: William L. Lee, Manager, Toxic Control

CITY AND COUNTY OF SAN FRANCISCO
(continued)

San Francisco Mayor's Office of Emergency Services
1111 Market Street, Second Floor
San Francisco, CA 94103
Attn: Thomas Jenkins, Acting Director

Mayor's Office of Housing and Economic Development
100 Larkin Street
San Francisco, CA 94102
Attn: Bill Witte, Director

Mayor's Office of Community Development
100 Larkin Street
San Francisco, CA 94102
Attn: Larry DeCarlo

Recreation & Park Department
McLaren Lodge
Golden Gate Park
Fell and Stanyan Streets
San Francisco, CA 94117
Attn: Mary Burns, General Manager

Police Department
Planning Division
Hall of Justice
850 Bryant Street
San Francisco, CA 94103
Attn: Lt. Thomas W. Suttmeier

San Francisco Unified School District
801 Toland Street
San Francisco, CA 94124
Attn: Lawrence Jacobson, Property Manager

San Francisco Real Estate Department
25 Van Ness Avenue, Suite 400
San Francisco, CA 94102
Attn: Anthony DeLucci, Director

San Francisco Water Department
1990 Newcomb Avenue
San Francisco, CA 94124
Attn: James D. Cooney, General Manager

CITY AND COUNTY OF SAN FRANCISCO (continued)

San Francisco Redevelopment Agency
939 Ellis Street
San Francisco, CA 94102
Attn: Thomas G. Conrad, Director, Planning and Programming

FEDERAL AND STATE AGENCIES

U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105
Attn: Skid Hall, Chief Permits Section

State Office of Intergovernmental Management (10)
State Clearinghouse
1400 – Tenth Street
Sacramento, CA 95814

California Department of Transportation
Transportation Planning
P.O. Box 7310
San Francisco, CA 94120
Attn: Gary Adams

California Department of Transportation
Public Transportation Branch
P.O. Box 7310
San Francisco, CA 94120
Attn: Eric Schatmeier

REGIONAL AGENCIES

Bay Conservation and Development Commission
30 Van Ness Avenue
San Francisco, CA 94102
Attn: Jeff Blanchfield, Director

Metropolitan Transportation Commission
101 Eighth Street
Oakland, CA 94604
Attn: Jeff Georgevich

Association of Bay Area Governments
P.O. Box 2050
Oakland, CA 94604
Attn: Raymond Brady, Manager, Analysis Group

REGIONAL AGENCIES (continued)

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
Attn: Irwin Mussen

San Francisco Regional Water Quality Control Board
1111 Jackson Street
Oakland, CA 94607
Attn: Stephen Hill, Environmental Specialist

Golden Gate Bridge, Highway and Transportation District
1011 Enderson Drive
San Rafael, CA 94901
Attn: Jerome M. Kuykendall, Director of Planning

AC Transit
Research and Planning
508 – 16th Street
Oakland, CA 94612
Attn: Theordore H. Reynolds, Assistant Manager

BART
Planning, Budget and Research
800 Madison Street
Oakland, CA 94604-2688
Attn: Howard L. Goode, Department Manager

SamTrans
Planning/Engineering
945 California Drive
Burlingame, CA 94010
Attn: Richard D. Gee, Director

LIBRARIES

San Francisco City Library – Civic Center
San Francisco, CA 94102
Attn: Office of Adult Service
Note: For Distribution

LIBRARIES

Environmental Protection Agency Library
215 Fremont Street
San Francisco, CA 94105
Attn: Jean Circiello

Stanford University Libraries
Jonsson Library of Government Documents
State and Local Documents Division
Stanford, CA 94305

Government Publications Department
San Francisco State University
1630 Holloway Avenue
San Francisco, CA 94132

Institute of Government Studies
1209 Moses Hall
University of California
Berkeley, CA 94720

XIII. BIBLIOGRAPHY AND REPORT OUTLINE

BIBLIOGRAPHY

Advisory Council on Historic Preservation, "Protection of Historic Properties Regulations of the Advisory Council on Historic Preservation Governing the Section 106 Review Process," 36 CFR Part 800, Washington, D.C., effective October 1, 1986.

Advisory Council on Historic Preservation, "Section 106, Step by Step," Washington, D.C., October 1986.

Alden, D., "Historic Evaluation of the Third Street Bridge Over Mission Channel Waterway at China Basin", City of San Francisco, City of San Francisco Department of Public Works, San Francisco, California, 1985.

Algermissen, S.T., W.A. Rinehart, James Dewey, et al., A Study of the Earthquake Losses in the San Francisco Bay Area: Data and Analysis, National Oceanic and Atmospheric Administration report, prepared for the Office of Emergency Preparedness, 1972.

Association of Bay Area Governments, "Building Stock and Earthquake Losses - The San Francisco Bay Area Example," Oakland, California, May, 1986.

Association of Bay Area Governments, "Erosion and Sediment Control Training Handbook, Oakland", California, May, 1982.

Association of Bay Area Governments, "Projections 83: Population, Employment, and Housing Forecast for the San Francisco Bay Area," Oakland, California, June, 1983.

Association of Bay Area Governments, "Projections 85: Population, Employment, and Housing for the San Francisco Bay Area," Oakland, California, July, 1985.

Association of Bay Area Governments, "Projections 87: Forecasts for the San Francisco Bay Area to the Year 2005," Oakland, California, July, 1987.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, "Results of the 1980/81 Hotspot Monitoring Program for Carbon Monoxide," Air Quality Technical Memo 40, Oakland, California, 1982.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, "Summary of 1979/80 CO Hotspot Monitoring Program," Air Quality Technical Memo 33, Oakland, California, 1980.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, "Urban Background Carbon Monoxide Levels in the Bay Area," Air Quality Technical Memo 42, Oakland, California, 1982.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission with assistance of the California Air Resources Board and the California Department of Transportation, 1982 Bay Area Air Quality Plan, San Francisco Bay Area, Oakland, California, December, 1982.

Banks, Peter C., "An Evaluation of the Cultural Resources Within the Mission Bay San Francisco Project, City and County of San Francisco, California," prepared for Jefferson Associates, San Francisco, California, May, 1983.

Bates, Robert L. and Julia A. Jackson, editors, Glossary of Geology, second edition, American Geological Institute, Falls Church, Virginia, 1980.

Bay Area Air Quality Management District, Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans, San Francisco, California, November 1985.

Bay Area Air Quality Management District, Air Quality Handbook 1985-1986, San Francisco, California, 1985.

Bay Area Air Quality Management District, "Base Year 1982 Emissions Inventory Summary Report," San Francisco, California, 1983.

Bay Area Air Quality Management District, "Base Year 1983 Emissions Inventory Summary Report," San Francisco, California, August, 1987.

Bay Area Air Quality Management District, "Contaminant and Weather Summaries, 1982-1985" (technical memos), San Francisco, California.

Bay Area Air Quality Management District, "Ozone Measurements and Trends in San Francisco Bay Area, 1965-1984," Information Bulletin 8-8-85, San Francisco, California, 1985.

Bay Area Council, "Bay Area Housing Briefs," Volume 5, Number 12, December 1986, and Volume 6, Number 5, May, 1987, San Francisco, California.

Bay Area Rapid Transit District, Quarterly Performance Report, July - September 1986, Oakland, California, 1986.

Bay Area Regional Earthquake Preparedness Project, "Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide," second edition, BAREPP 85-10, Oakland, California, October, 1985.

Bean, W., California: An Interpretive History, McGraw-Hill Book Company, New York, New York, 1973.

Becker and Hayes, Inc., and Omni-Group, Inc., "Functional and Space Requirements for a New San Francisco Main Public Library Building on Marshall Square," Santa Monica, California, September 30, 1986.

Bertero, Vitelmo V., "Strength and Deformation Capacities of Buildings Under Extreme Environments," in Karl S. Pister, editor, Structural Engineering and Structural Mechanics, Prentice-Hall, Englewood Cliffs, New Jersey, 1977.

Blume, John A., "San Francisco Seismic Safety Investigation, Geologic Evaluation", URS Associates, San Francisco, California, 1974.

Bolt, Beranek, and Newman, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances," report number NTID300.1, prepared for the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C., December, 1971.

Borcherdt, Roger D., James F. Gibbs, and Kenneth Lajoi, "Predictions of Maximum Earthquake Intensities in the San Francisco Bay Region, California, for Large Earthquakes on the San Andreas and Hayward Faults," MF-0709, U.S. Geological Survey, Reston, Virginia, 1975.

Brannon, J.M., "Evaluation of Dredge Material Pollution Potential," Technical Report DS-78-6, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi, 1978.

Bretherick, L., Handbook of Reactive Chemical Hazards, second edition, Butterworth, London, 1979.

Britton and Company, "Railroad Map of the City of San Francisco," San Francisco Directory, San Francisco, 1864.

Brock, Thomas D., Biology of Microorganisms, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1979.

Brown, A.W.A., Ecology of Pesticides, John Wiley & Sons, New York, 1978.

Bryant, K., History of the Atchison, Topeka and Santa Fe Railway, MacMillan Publishing Company, New York, New York, 1974.

Buechner, Robert D., editor, "National Park, Recreation and Open Space Standards," National Recreation and Park Association, 1971, as cited in Seymour M. Gold, Recreation Planning and Design, McGraw-Hill, Inc., New York, New York, 1980.

Building Owners & Managers Association of San Francisco, Square Footage: The Greater San Francisco Office Marketing and Leasing Guide, Volume One, San Francisco, California, 1986.

California Administrative Code (California Code of Regulations), Title 22, Division 4, Chapter 30, Article 9: Hazardous Wastes and Hazardous Materials.

California Air Resources Board, "Air Quality Data Summary," Sacramento, California, 1986.

California Air Resources Board, "Particulate Matter Inventory, Weight Fractions by Particulate Matter Category," Sacramento, California, July 27, 1987.

California Department of Finance, "Population and Housing Estimates for California Cities and Counties," for January 1, 1986, Summary Report E-5, Sacramento, California, April 29, 1986.

California Department of Finance, "Population Projections for California Counties 1980-2020 with Age/Sex Detail to 2020 DOF Baseline 86," Report 86-P-3, Sacramento, California, December, 1986.

California Department of Finance, "Projected Total Population of California Counties: July 1, 1985 to July 1, 2020," Report 86 P-1, Sacramento, California, December, 1986.

California Department of Finance, Population Research Unit, "Projected Age Distribution of San Francisco Total Population, Years 2000 and 2020, WKSP Form 4," Sacramento, California, April, 1987.

California Department of Finance, Population Research Unit, "Projection Summary: K-12 Public School Enrollment, Total Graded Enrollment by County, by School Year," Sacramento, California, July 9, 1986.

California Department of Fish and Game, California Fish and Wildlife Plan, Sacramento, California, January, 1966 (in revision).

California Department of Transportation, CalTrain Peninsula Commute Service Five-Year Plan 1986-1991, Sacramento, California, July, 1986.

California Department of Transportation, Energy and Transportation Systems, Sacramento, California, July, 1983.

California Department of Transportation, Highway Operations Branch, District 04, "1985 Transit Time and Speed Profile Charts," Sacramento, California, 1985.

California Department of Transportation, "Proposed Rail Maintenance Facility for Peninsula Commute Service, Project Description," Sacramento, California, September, 1987.

California Department of Transportation, "Route Concept Report -- Route 480," Sacramento, California, September, 1986.

California Department of Transportation, "Route Concept Report -- Interstate 280," Sacramento, California, December, 1985.

California Department of Transportation, "Route Concept Report -- Route I-80, Final," Sacramento, California, July 25, 1985.

California Department of Transportation, "Route Concept Report -- Route 1," Sacramento, California, Undated.

California Department of Transportation, "Route Concept Report -- Route 101," Sacramento, California, March, 1986.

California Department of Transportation, City and County of San Francisco, Metropolitan Transportation Commission, I-280 Transfer Concept Program Environmental Impact Report, Draft, Sacramento, California, September, 1984.

California Employment Development Department, "Annual Average Wage and Salary, Employment by Industry for Metropolitan Statistical Areas," March 1985 Benchmark, San Francisco, California, March 1986.

California Employment Development Department, Annual Planning Information: 1985-1986, San Francisco City and County, San Francisco, California, May, 1985.

California Employment Development Department, Annual Planning Information: 1986-1987, Alameda County, Contra Costa County, Marin County, Napa County, San Francisco City and County, San Jose MSA, San Mateo County, Santa Rosa-Petaluma MSA, Solano County, San Francisco, California, May 1986.

California Employment Development Department, Occupations in Selected Industries: San Francisco City and County, San Francisco, California, September 1981.

California Energy Commission, "Biennial Report," Sacramento, California, 1983.

California Energy Commission, Building Energy Efficiency Standards, Sacramento, California, 1987.

California Energy Commission, "The 1985 California Electricity Report," Sacramento, California, 1985.

California Environmental Quality Act Guidelines.

California Health and Safety Code, Division 20, Article 6.5, Section 25122.7.

California Gas and Electric Utilities, "1987 California Gas Report," September, 1987.

California Government Code Sections 66500 et seq.

California Government Code Section 66605(a), McAteer-Petris Act.

California Native Plant Society, Inventory of Rare and Endangered Vascular Plants of California, Special Publication No. 1, third edition, Sacramento, California, 1984.

California Office of Planning and Research, 1987 California Permit Handbook, Sacramento, California, December, 1986.

California Public Utilities Commission, Regulation of Public Utilities and Transportation Companies in the State of California: A Handbook, San Francisco, California, March 1984.

California Regional Water Quality Control Board, San Francisco Bay Region, "Water Quality Control Plan, San Francisco Bay Basin (2)," 1982 and proposed amendments, December, 1986.

California Seismic Safety Commission, "Earthquake Safety: Potentially Hazardous Buildings," Report of the Committee on Hazardous Buildings, Report No. SSC 85-04, Sacramento, California, November, 1985.

California State Lands Commission, "The Public Trust - Your Right to Enjoy California's Waterways" (brochure), Sacramento, California, undated.

Chan, Emy, et al., "The Use of Wetlands for Water Pollution Control," Association of Bay Area Governments, in association with Ramlit Associates, Oakland, California, November, 1981.

Chavez, David and Associates, "Cultural Resources Evaluation for the Mission Bay Project, San Francisco, California," prepared for Environmental Science Associates, Inc., San Francisco, California, December, 1987.

CH$_2$M Hill Engineers, in-house study, prepared for Jefferson Associates, San Francisco, California, 1983.

City and County of San Francisco, "Bayside Overflows," prepared by CH$_2$M Hill Engineers, San Francisco, California, 1979.

City and County of San Francisco, "County Health Services Plan Update and Budget for Fiscal Year 1985-86," San Francisco, California, September 13, 1985.

Code of Federal Regulations, Title 40.

Coldwell Banker, "Office Vacancy Index," quarterly reports, Los Angeles, California, September 1982 and March 1985 through December 1986.

Constance, L., "Frittilaria liliadea Rare Plant Status Report," California Native Plant Society, Sacramento, California, 1977.

Construction Industry Research Board, "New Housing Units in Building Permits Issued, 1977-86: California and Metropolitan Areas," Sacramento, California, February, 1987.

Cuneo, K., "Feasibility Study, Wetland Habitat Creation at the Mission Bay Project Site," prepared for Environmental Science Associates, Inc., San Francisco, California, 1987.

Cushman and Wakefield, San Francisco Market Research Department, "Quarterly Update," San Francisco, California, January 15, 1986.

Dames & Moore, "Geotechnical Consultation, Mission Bay Project, San Francisco, California," San Francisco, California, December 1, 1982.

Dames & Moore, "Preliminary Report, Geotechnical Consultation, Mission Bay Development," prepared for Jefferson Associates, San Francisco, California, April 15, 1982.

Davis, James F., John H. Bennett, Glenn A. Borchardt, et al., "Earthquake Planning Scenario for a Magnitude 8.3 Earthquake on the San Andreas Fault in the San Francisco Bay Area," California Department of Conservation, Division of Mines and Geology, Special Publication 61, Sacramento, California, 1982.

DKS Associates, "Patronage Effects of CalTrain Station Relocation," prepared for Santa Fe Pacific Realty Corporation, San Francisco, California, November, 1986.

Dow, G., "Bay Fill in San Francisco: A History of Change," master's thesis, San Francisco State University, San Francisco, California, 1973.

Duke, D. and S. Kistler, Santa Fe: Steel Rails Through California, Golden West Books, San Marino, California, 1963.

Eisler, R., Cadmium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, U.S. Fish and Wildlife Service, Biological Report 85(1.2), Contaminant Hazard Reviews Report No. 2, July, 1985.

Eisler, R, Chromium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, U.S. Fish and Wildlife Service, Biological Report 85(1.6), Contaminant Hazard Reviews Report No. 6, January, 1986.

Eisler, R., Selenium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, U.S. Fish and Wildlife Service, Biological Report 85(1.5), Contaminant Hazard Reviews Report No. 5, October, 1985.

Eldridge, M.B. and W.M. Kail, "San Francisco Bay Areas' Herring Resource -- A Colorful Past and a Controversial Future," U.S. National Marine Fisheries Service, Marine Fish Review 35(11): 25-31, 1973.

Environmental Science Associates, Inc., Mission Bay Hazards Project Mitigation Program (Draft), San Francisco, California, August, 1988.

Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual, Washington, D.C., 1987.

Fair, Gordon, John Geyer and Daniel Okun, Water and Wastewater Engineering, John Wiley and Sons, New York, New York, 1966.

Federal Energy Administration, The Planner's Energy Workbook, Washington, D.C., 1977.

Federal Home Loan Bank of San Francisco, "Housing Vacancy Survey: San Francisco County," San Francisco, California, September-November 1979.

Federal Home Loan Bank of San Francisco, "Housing Vacancy Survey: San Francisco County, Survey Data September 1985," San Francisco, California, 1986.

Federal Home Loan Bank of San Francisco, "Housing Vacancy Survey: San Francisco County, Survey Date September 1986," San Francisco, California, March, 1987.

Federal Home Loan Bank of San Francisco, "Housing Vacancy Surveys for Bay Area Counties, Survey Dates July and September 1985," San Francisco, California, August, September, October, 1985; February, March, 1986; November 1986; January, March, May, 1987.

Foundation for San Francisco's Architectural Heritage, "South of Market Street - A Brief Guide to its Architecture: Parts I and II," Heritage Newsletter, Volume XIII, Numbers 2 and 3, 1986.

Fuller Commercial Brokerage Company, "San Francisco Office Leasing Market Report," San Francisco, California, November 1, 1985.

Gallelli Real Estate, Inc., "Office Space Survey for the Downtown Financial District, San Francisco, California," San Francisco, California, June, 1985.

Garcia, A.W. and James R. Houston, U.S. Army Corps of Engineers Waterways Experiment Station, "Type 16 Flood Insurance Study: Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound," Technical Report H-75-17, prepared for U.S. Department of Housing and Urban Development, Federal Insurance Administration, Washington D.C., November, 1975.

Gensoul, A., "Railroad Map of the City of San Francisco," Britton and Company, San Francisco, California, undated.

Golden, Jack, et al., Environmental Impact Data Book, Ann Arbor Science Publishers Inc., Ann Arbor, Michigan, 1979.

Goldman, Harold B., 'Geology of San Francisco Bay', in Harold B. Goldman, editor, "Geologic and Engineering Aspects of San Francisco Bay Fill," California Department of Conservation, Division of Mines and Geology, Special Report 97: 11-29, Sacramento, California, 1969.

Goldman, Steven J., Katherine Jackson, and Taras A. Bursztynsky, Erosion and Sediment Control Handbook, McGraw-Hill, New York, New York, 1986.

Grubb & Ellis, "Office Vacancy Study, San Francisco Financial District," San Francisco, California, October 1, 1985.

Hackett, F., editor, The Industries of San Francisco: Her Rank, Resources, Advantages, Trade, Commerce and Manufactures, Conditions of the Past, Present and Future, Representative Industrial Institutions, Historical Descriptive and Statistical, Payot, Upham and Company, San Francisco, California, 1884.

Hannon, B., et al., "Energy and Labor in the Construction Sector," Science 202:837-847, 1978.

Harding Lawson Associates, "Stadium Feasibility Analysis: A Study of Alternatives for a Stadium for the City of San Francisco, Volume 1, Research and Data," San Francisco, California, 1983.

Hem, J.D., Study and Interpretation of the Chemical Characteristics of Natural Water, second edition, U.S. Geological Survey Water-Supply Paper 1473, U.S. Government Printing Office, Washington, D.C., 1970.

Hill International, "Peninsula Commute Service Interim Upgrade Study, Part 1, Interim Upgrade Definition," prepared for Peninsula Corridor Study Joint Powers Board, San Jose, California, September 15, 1987.

Hill International, "Peninsula Commute Service Interim Upgrade Study, Volume I, Summary Report," October 31, 1987.

Huston, John W., and William C. Huston, Techniques for Reducing Turbidity Associated with Present Dredging Procedures and Operations, prepared for Environmental Effects Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Dredged Material Research Program, Contract Report D-76-4, May, 1976.

Ingles, L., Mammals of the Pacific States, Stanford Press, Stanford, California, 1965.

Institute of Transportation Engineers, Parking Generation, Second Edition, Washington, D.C., 1987.

Interactive Resources, Inc., Energy Conservation: Guidelines for Evaluating New Development in Contra Costa County, California, Point Richmond, California, 1976.

Josselyn, M., "The Ecology of the San Francisco Bay Tidal Marshes: A Community Profile," U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-83/23, Washington, D.C., 1985.

Josselyn, Michael and James Buchholz. "Marsh Restoration in San Francisco Bay: A Guide to Design and Planning," Technical Report #3, Tiburon Center for Environmental Studies, San Francisco State University, San Francisco, California, 1984.

KCA Engineers, Inc., "Mission Bay Site Investigation," San Francisco, California, February, 1983.

Kibler, David F., editor, "Urban Stormwater Hydrology," Water Resources Monograph 7, American Geophysical Union, Washington, D.C., 1982.

Knowlton Realty Ltd., "Downtown San Francisco Office Space: An Analysis and Survey," San Francisco, California, January 1, 1986.

Krone, Ray, 'Engineering Wetlands: Circulation, Sedimentation and Water Quality' in Michael Josselyn, editor, "Wetland Restoration in California," Tiburon Center for Environmental Studies, California Coastal Commission and Coastal Heritage Foundation, Report No. T-CSGCP-007, San Francisco, California, December 1982.

Langley, H., The San Francisco City Directory, various publishers, San Francisco, 1858, 1860, 1864, and 1873.

Laudenslayer, W.F., Jr. and W.E. Grenfell, Jr., "A List of Amphibians, Reptiles, Birds, and Mammals of California," Outdoor California, 44(1):5-14, 1983.

Lawson, Andrew C., et al., The California Earthquake of April 18, 1906: Report of the State Earthquake Investigation Commission, Carnegie Institution, Washington, D.C., 1908.

Lee, Charles H. and Michael Praszker, 'Bay Mud Developments and Related Structural Foundations', in Harold B. Goldman, editor, "Geologic and Engineering Aspects of San Francisco Bay Fill," California Department of Conservation, Division of Mines and Geology, Special Report 97: 43-85, Sacramento, California, 1969.

Levy, R., Handbook of North American Indians, Volume 8, Robert F. Heizer, editor, Smithsonian Institution, Washington, D.C., 1978.

Lockwood, C., Suddenly San Francisco: The Early Years of an Instant City, San Francisco Examiner, San Francisco, California, 1978.

Marconi, William, "Port of San Francisco Southern Waterfront Improvements Traffic Study," prepared for Port of San Francisco, San Francisco, California, September 29, 1985.

Martin, A. C., H. S. Zim and A. L. Nelson, American Wildlife and Plants: A Guide to Wildlife Food Habits, Dover Publications, New York, New York, 1951.

McCaskie, G., P. DeBenedictis, R. Erickson and J. Morlan, Birds of Northern California and Annotated Field List, second edition, Golden Gate Audobon Society, Berkeley, California, 1979.

McGuire, Chester C., "San Francisco Labor Pool Analysis," prepared for San Franciscans for Reasonable Growth, San Francisco, California, December, 1985.

McKee, J.E. and H.W. Wolf, Water Quality Criteria, second edition, California State Water Quality Control Board, Publication No. 3-A, 1963.

Metropolitan Transportation Commission, "1980 Census Journey-to-Work: County-to-County and Superdistrict-to-Superdistrict Workers by Mode of Travel, Data Release #2," Oakland, California, July 1984, revised September 5, 1984.

Metropolitan Transportation Commission, "1980 Regional Travel Characteristics, Working Paper 8 and Appendix 6," Metropolitan Transportation Commission Travel Survey, Oakland, California, 1981.

Metropolitan Transportation Commission, Regional Transportation Plan for the Nine County San Francisco Bay Area, Oakland, California, 1984.

Metropolitan Transportation Commission, Resolution No. 1876, Oakland, California, 1988.

Metropolitan Transportation Commission, Resolution No. 1547, Oakland, California, 1986.

Metropolitan Transportation Commission, "SCR74 Peninsula Mass Transit Study: Final Report to the Legislature," Oakland, California, July 31, 1985.

Metropolitan Transportation Commission, Transportation Improvement Program, Amendment No. 86-15, adopted March 14, 1986 by Metropolitan Transportation Commission Resolution No. 1580, Oakland, California, 1986.

Metropolitan Transportation Commission, Year 2000 Travel Forecasts -- Trip by Mode and Network Assignments, Technical Summary, Fremont-South Bay and Pittsburg-Antioch Corridor Alternatives Analyses, Oakland, California, July, 1987.

Metropolitan Transportation Commission and Bay Conservation and Development Commission, San Francisco Bay Area Seaport Plan, Oakland, California, 1982.

Mikesell, S., "Truss Bridge Rating Sheet: Bridge No. 34C-27, San Francisco," California Department of Transportation, Sacramento, California, 1985.

Miller, G.C., and R.G. Zepp, 2,3,7,8-TCDD: Environmental Chemistry, U.S. Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, Georgia, EPA/600/D-37/086, March, 1987.

National Institute for Occupational Safety and Health, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, U.S. Department of Health and Human Services, October, 1985.

National Planning Association, Regional Economics Projections Series, Washington, D.C., 1986.

Nichols, D. R., and N.A. Wright, "Preliminary Map of Historic Margins of Marshland, San Francisco Bay," Open-File Report 71-0216, U.S. Geological Survey, 1971.

Null, E. Jan, "Climate of San Francisco," NOAA Technical Memorandum, National Weather Service WR-126, Washington, D.C., February, 1978.

Oak Ridge National Laboratory, Energy Data Book: Edition 8, Tennessee, 1985.

Olmsted, Nancy, Vanished Waters: A History of San Francisco's Mission Bay, Mission Creek Conservancy, San Francisco, California, 1986.

Olmstead, R., N. Olmstead and A. Pastron, "San Francisco Waterfront: Report on Historic Cultural Resources," San Francisco Wastewater Management Program, San Francisco, California, 1977.

Olmsted, R., N. Olmsted, D. Fredrickson, and V. Bente, "San Francisco Bayside: Historic Cultural Resource Survey," San Francisco Clean Water Program, San Francisco, California, 1982.

Ontario Department of Education, Community Programs Division, "Standards and Definition of Terms," as cited in Joseph DeChiara and Lee E. Koppelman, Site Planning Standards, McGraw-Hill, Inc., 1978.

Pacific Gas and Electric Company, "Annual Report, 1985," San Francisco, California, 1985.

Pacific Gas and Electric Company, "Forecast of the Demand for Electricity within the Pacific Gas and Electric Company Service Area 1987-2007," San Francisco, California, June, 1987.

Pacific Gas and Electric Company, 1985 Class Load Study, San Francisco, California, February, 1987.

Pacific Gas and Electric Company, "PG&E Service Area Economic and Demographic Forecasting Reports," Golden Gate Region, San Francisco, California, March, 1987.

Pacific Properties Group, "Corporate Relocations from San Francisco in the 1980's," June 1985.

Pastron, A., et al., "Behind the Seawall," Three Volumes, San Francisco Clean Water Program, San Francisco, California, 1981.

Pequegnat, W.E., "An Assessment of the Potential Impact of Dredged Material Disposal in the Open Ocean," Technical Report D-78-2, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi, 1978.

Perkins, Jeanne B., "San Francisco Bay Area - On Shaky Ground," Association of Bay Area Governments, Oakland, California, February, 1987.

Plunkett, E.R., Handbook of Industrial Toxicology, Chemical Publishing Co., Inc. New York, 1976.

Port Commission of the City and County of San Francisco, "Official Statement Relating to $42,500,000 Port Commission of San Francisco Revenue Bonds, Series C," San Francisco, California, November 16, 1984.

Port of San Francisco, "San Francisco - A Port That Is 'On A Roll'," Wharfside, San Francisco, California, September/October, 1985.

Port of San Francisco, "San Francisco Container Terminal Modernization Final Environmental Impact Statement," 85.123E, San Francisco, California, certified January 23, 1986.

Potrero Hill Community Development Corporation, "Potrero District Economic Development Inventory (Second Interim Report)," prepared for the Mayor's Office of Housing and Economic Development, San Francisco, California, September 1986.

Pushkarev, B. and J. Zupan, Urban Space for Pedestrians, MIT Press, Boston, Massachusetts, 1978.

Rantz, S.E., Mean Annual Precipitation and Precipitation - Duration - Frequency Data for the San Francisco Bay Region, California, U.S. Geological Survey, Open-File Report, prepared in cooperation with the U.S. Department of Housing and Urban Development, San Francisco Bay Region Environment and Resources Planning Study, Basic Data Contribution 32, 1971.

Real, Charles R., "Probabilistic Long-Term Forecasts of Major Earthquakes in the San Francisco Bay Region, Bay Area Earthquake Study," Oakland, California, 1984.

Real Estate Research Council of Northern California, "Northern California Real Estate Report: Market Trend - October 1986, Single Family Residences," Volume 38, Number 2, San Francisco, California, February, 1987.

Recht Hausrath & Associates, "Summary of the Economic Basis for an Office-Housing Production Program," prepared for the San Francisco Department of City Planning, San Francisco, California, July 19, 1984.

Reilly, Paul N. and Thomas O. Moore, "Pacific Herring, Clupea harengus pallasii, Studies in San Francisco Bay and the Gulf of the Farallones, June 1984 to March 1985," California Department of Fish and Game, Marine Resources Administration Report 85-4: 1-73, Sacramento, California, 1985.

Ritter, J.R. and W.R. Dupre, Map showing potential inundation by tsunami in the San Francisco Bay Region, California, U.S. Geological Survey Miscellaneous Field Studies Map MF-480, 1972.

Roesner, Larry A., "Quality of Urban Runoff" in Urban Stormwater Hydrology, David F. Kiber, editor, American Geophysical Union, Water Resources Monograph 7, Washington, D.C., 1982.

Sanborn Map Company, "Sanborn Insurance Map," Sanborn Map Company, New York, New York, 1913.

San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan, San Francisco, California, adopted January, 1969, amended, July 1979.

San Francisco Bay Conservation and Development Commission, San Francisco Waterfront Special Area Plan, San Francisco, California, adopted, April 1975, as amended.

San Francisco Bay Conservation and Development Commission, "Staff Report on Water Quality in San Francisco Bay," San Francisco, California, January 1987.

San Francisco Bay Regional Water Quality Control Board, "Water Quality Control Plan," San Francisco Bay 1982, and Amendments, 1986.

San Francisco Bay Regional Water Quality Control Board, U.S. Army Corps of Engineers, and U.S. Environmental Protection Agency, "Interim Testing Procedure for Evaluating Dredged Material Suitability for Open-Water Disposal in San Francisco Bay," Joint Public Notice No. 87-1, Oakland, California, June 29, 1987.

San Francisco Board of Supervisors, "CalTrain Terminal Relocation," Resolution No. 242-87, San Francisco, California, March 30, 1987.

San Francisco Board of Supervisors, "Hazardous Materials Permit and Disclosure Ordinance," Ordinance No. 443-86, File No.11885-6, San Francisco, California, November 13, 1986.

San Francisco Board of Supervisors, Resolution No. 242-87, File No. 479-86, San Francisco, California, April 9, 1987.

San Francisco City Planning Code.

San Francisco Clean Water Program, Annual Report, North Shore Receiving Water Monitoring Report, July 1985-June 1986 and July 1986-June 1987, San Francisco, California.

San Francisco Department of City Planning, "CalTrain Station Locations, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Barton-Aschman Associates, Inc., San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Canal Systems, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Danadjieva and Koenig Associates, Wetlands Research Associates, Inc., Philip Williams and Associates, Inc., KCA Engineers, Inc., and Dames & Moore, San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Center City Circulation and Goods Movement," Working Papers 1, 2, 3, and Final Report, San Francisco, California, 1980.

San Francisco Department of City Planning, Central Waterfront Plan, adopted by City Planning Commission, Resolution 8631, San Francisco, California, July 3, 1980.

San Francisco Department of City Planning, "Choices for Mission Bay -- Planning Considerations (Draft)," San Francisco, California, June 11, 1986.

San Francisco Department of City Planning, Commerce and Industry Element, adopted by the City Planning Commission, Resolution 8001, San Francisco, California, June 29, 1978.

San Francisco Department of City Planning, "Commercial Building Prototypes, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by ELS/Elbasani and Logan Architects, Kwan-Henmi Architects, San Francisco, California, September, 1986.

San Francisco Department of City Planning, Community Safety Element, adopted by the City Planning Commission, Resolution 7241, San Francisco, California, September 12, 1974.

San Francisco Department of City Planning, "Community Services/Cultural Facilities, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Carl Anthony and Associates, San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Container Terminal Options, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Moffat and Nichol Engineers, San Francisco, California, September, 1986.

San Francisco Department of City Planning, Downtown Plan, adopted by City Planning Commission, Resolution 10163, San Francisco, California, November 29, 1984.

San Francisco Department of City Planning, Downtown Plan Environmental Impact Report, EE81.3, San Francisco, California, certified October 18, 1984.

San Francisco Department of City Planning, "Economic Base/Employment Opportunities, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Institute for the Future, San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Economic Feasibility, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Dr. Chester C. McGuire, San Francisco, California, September, 1986.

San Francisco Department of City Planning, Energy Conservation Potential for Natural Gas and Electricity: 1980-1990, San Francisco, California, 1981.

San Francisco Department of City Planning, Energy Element, adopted by the City Planning Commission, Resolution 9409, San Francisco, California, June 3, 1982.

San Francisco Department of City Planning, "Energy Supply and Consumption Patterns: Trends and Prospects, 1975 - 1985," San Francisco, California, 1980.

San Francisco Department of City Planning, Environmental Protection Element: Plan for Conservation, adopted by the City Planning Commission, Resolution 7020, San Francisco, California, May 24, 1973; and Plan for Transportation Noise Control, adopted by the City Planning Commission, Resolution 7244, San Francisco, California, September 19, 1974.

San Francisco Department of City Planning, Executive Park Development Plan Amendment, Final Subsequent Environmental Impact Report, EE 81.197E, San Francisco, California, certified October 17, 1985.

San Francisco Department of City Planning, "Existing Land Uses/Employment: Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Recht Hausrath & Associates, San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Housing Information Series: Changes in the San Francisco Housing Inventory, 1980," San Francisco, California, 1981.

San Francisco Department of City Planning, "Housing Information Series: Changes in the San Francisco Housing Inventory, 1981-1982," San Francisco, California, September, 1983.

San Francisco Department of City Planning, "Housing Information Series: Changes in the San Francisco Housing Inventory, 1983-1984," San Francisco, California, July, 1985.

San Francisco Department of City Planning, "Housing Information Series: Changes in the San Francisco Housing Inventory, 1985," San Francisco, California, August, 1986.

San Francisco Department of City Planning, "Housing Information Series: Changes in the San Francisco Housing Inventory, 1986," San Francisco, California, June, 1987.

San Francisco Department of City Planning, "Housing Mix/Finance/Building Prototypes, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Gabriel-Roche, Inc., Daniel Solomon and Associates, San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Infrastructure Costs, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by KCA Engineers, Inc., San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Jobs/Housing Relationship, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Institute for the Future, San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Major Office Building Construction in San Francisco through 1983," San Francisco, California, March 15, 1983.

San Francisco Department of City Planning, "Major Projects Completed in 1985," San Francisco, California, December 31, 1985.

San Francisco Department of City Planning, "Major Projects Completed in 1986," San Francisco, California, November 4, 1986.

San Francisco Department of City Planning, "Major Projects Under Construction," San Francisco, California, November 4, 1986.

San Francisco Department of City Planning, The Mission Bay Plan, Proposal for Citizen Review, San Francisco, California, January, 1987.

San Francisco Department of City Planning, "MUNI Metro Configuration, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Robert L. Harrison, San Francisco, California, September, 1986.

San Francisco Department of City Planning, Neighborhood Center Facilities Plan, adopted by the City Planning Commission, Resolution 7646, San Francisco, California, January 20, 1977.

San Francisco Department of City Planning, "Noise/Buffering, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Charles M. Salter Associates, Inc., San Francisco, California, September 4, 1986.

San Francisco Department of City Planning, Northeastern Waterfront Plan, adopted by the City Planning Commission, Resolution 7643, January 31, 1980, Resolution 8596, May 29, 1980 and Resolution 8781, San Francisco, California, December 4, 1980.

San Francisco Department of City Planning, Pier 50 Drydock Negative Declaration, 84.124E, San Francisco, California, September 7, 1984.

San Francisco Department of City Planning, Plan for Police Facilities, adopted by the City Planning Commission, Resolution 7233, San Francisco, California, August 24, 1974.

San Francisco Department of City Planning, Recreation and Open Space Element, adopted by City Planning Commission, Resolution 11065, San Francisco, California, July 9, 1987.

San Francisco Department of City Planning, Residence Element, adopted by the City Planning Commission, Resolution 10045, San Francisco, California, June 28, 1984.

San Francisco Department of City Planning, "Retail Demand, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Recht Hausrath & Associates, San Francisco, California, September, 1986.

San Francisco Department of City Planning, Rincon Hill Plan, adopted by the City Planning Commission, Resolution 10378, San Francisco, California, July 18, 1985.

San Francisco Department of City Planning, "San Francisco Container Terminal Modernization, Final Environmental Impact Report," 85.123E, San Francisco, California, certified January 23, 1986.

San Francisco Department of City Planning, "Seismic Safety, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by EQE, San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Sewage Overflow Options, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by KCA Engineers, Inc., San Francisco, California, September, 1986.

San Francisco Department of City Planning, "Soil Conditions, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Dames & Moore, et al., San Francisco, California, September, 1986.

San Francisco Department of City Planning, Solid Waste Sludge Transportation, Negative Declaration, 86.359E, San Francisco, California, July 25, 1986.

San Francisco Department of City Planning, South Bayshore Plan, adopted by the City Planning Commission, Resolution 6486, San Francisco California, February 19, 1970.

San Francisco Department of City Planning, South Bayshore Area Plan: Proposal for Adoption, San Francisco, California, October 17, 1985.

San Francisco Department of City Planning, "South of Market Interim Zoning Controls," San Francisco, California, October, 1986.

San Francisco Department of City Planning, South of Market Plan, Proposal for Citizen Review, San Francisco, California, June, 1985.

San Francisco Department of City Planning, South of Market Rezoning Study: Housing, Business Activity, Neighborhood Livability Research Findings, San Francisco, California, March, 1985.

San Francisco Department of City Planning, Transportation Element, adopted by the City Planning Commission, Resolution 6834, April 27, 1972; Resolution 7647, January 20, 1977; Resolution 9434, June 24, 1982; and Resolution 10164, November 29, 1984, San Francisco, California.

San Francisco Department of City Planning, "Transportation Network, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by DKS Associates, San Francisco, California, September, 1986.

San Francisco Department of City Planning, Urban Design Element, adopted by the City Planning Commission, Resolution 6745, San Francisco, California, August 26, 1971.

San Francisco Department of City Planning, Van Ness Avenue Plan, Proposal for Citizen Review, May, 1983, Interim Controls adopted by the City Planning Commission, Resolution 10995, San Francisco, California, April 19, 1987.

San Francisco Department of City Planning, "Wetlands/Playfields, Mission Bay, San Francisco," Special Study for Mission Bay, prepared by Danadjieva and Koenig Associates, Wetlands Research Associates, Inc., Philip Williams and Associates, Inc., San Francisco, California, September, 1986.

San Francisco Department of Public Health, Community Substance Abuse Services, Division of Drug Programs, "Drug Program Plan and Budget 1985-1986," San Francisco, California, 1985.

San Francisco Department of Public Health, Community Substance Abuse Services, Division of Alcohol Programs, 1984-1985 Update, San Francisco County Alcohol Program Plan and Budget, San Francisco, California, September 1984.

San Francisco Department of Public Health, Division of Mental Health Programs, "1987-1988 Action Plan," San Francisco, California, November 1986.

San Francisco Department of Public Works, Bureau of Engineering, "Subdivision Regulation," adopted by Department of Public Works Order No. 124,677, San Francisco, California, January 6, 1987.

San Francisco Fire Department, Annual Report, 1985-86, and Annual Report, 1981-82.

San Francisco Municipal Railway, "Capital Improvement Program 1987-1992," San Francisco, California, June, 1987.

San Francisco Municipal Railway, "MUNI Timetables All Lines - Spring/Summer 1986," San Francisco, California, 1986.

San Francisco Municipal Railway, Short-Range Transit Plan, 1986-1991, San Francisco, California, June, 1986.

San Francisco Municipal Railway, Short-Range Transit Plan, 1987-1992, San Francisco, California, June, 1987.

San Francisco Municipal Railway, "Urban Mass Transit Section 15 Reporting Requirements Year Ending June 30, 1986," San Francisco, California, 1986.

San Francisco Police Department, "Are We Prepared?: A Study of San Francisco Police Department Facilities," San Francisco, California, 1987.

San Francisco Police Department, "Incidents for Which a Police Report Was Made by District, Plot and Crime," San Francisco, California, January to December, 1985.

San Francisco Police Department, "San Francisco Police Department $28,000,000 Bond Proposal," San Francisco, California, May 27, 1987.

San Francisco Police Department, Office of the Police Commission, "Stars in Action, Serving Our City, San Francisco Police Department Annual Report, Fiscal Year 1984-85," San Francisco, California, July 9, 1985.

San Francisco Port Commission, Conceptual Maritime Master Planning for Southern Waterfront, prepared by Vickerman-Zachary-Miller, Engineering & Architecture Consultants, San Francisco, California, October 1, 1981.

San Francisco Port Commission, "Maritime Strategy II, Maritime and Commercial Land Use Objectives," San Francisco, California, June 30, 1979.

San Francisco Public Utilities Commission, "San Francisco Water and Power," San Francisco, California, January, 1985.

San Francisco Public Utilities Commission, Bureau of Energy Conservation, "An Energy Plan for Mission Bay, Proposed Energy Efficiency Recommendations at the Mission Bay Project, Draft," San Francisco, California, 1987.

San Francisco Redevelopment Agency, Rincon Point-South Beach Redevelopment Plan, adopted by the Board of Supervisors, Ordinance No. 14-81, January 5, 1981; and Ordinance No. 50-84, San Francisco, California, January 23, 1984.

San Francisco Redevelopment Agency, "San Francisco Redevelopment Program Fact Book: 1985," San Francisco, California, 1985.

San Francisco Redevelopment Agency, Yerba Buena Center Redevelopment Plan, originally adopted by the Board of Supervisors, Ordinance No. 98-66, April 25, 1966 and by subsequent amendments: Ordinance No. 201-71, July 26, 1971; Ordinance No. 393-73, October 9, 1973; Ordinance No. 386-77, September 13, 1976; Ordinance No. 367-77, August 8, 1977; Ordinance No. 420-79, August 13, 1979; and Ordinance No. 538-81, San Francisco, California, November 2, 1981.

San Francisco Unified School District, "School Capacity Report," San Francisco, California, September 1986.

San Francisco Unified School District, Student Attendance Department, "Active Enrollment, San Francisco, California, Spring, 1986," San Francisco, California, 1986.

Sax, N. I. and R. J. Lewis, editors, Rapid Guide to Hazardous Chemicals in the Workplace, Van Nostrand Reinhold Co., Inc., New York, New York, 1986.

Schlocker, Julius, "Geology of the San Francisco North Quadrangle, California," U.S. Geological Survey, Professional Paper 782, Washington, D.C., 1974.

Sehgal, Ellen, "Occupational Mobility and Job Tenure in 1983," Monthly Labor Review, Volume 107, Number 10, U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C., October, 1984.

Sharpsteen, W., "Vanished Waters of Southeastern San Francisco: Note on Mission Bay and the Marshes and Creeks of the Potreros and the Bernal Rancho," California Historical Society Quarterly, 21(2):113-126, 1942.

Shreve, R. Norris, The Chemical Process Industry, McGraw Hill, 1945.

Sittig, M., Handbook of Toxic and Hazardous Chemicals and Carcinogens, second edition, Noyes Publications, Park Ridge, N.J., 1985.

Snyder, J., "Historic Architectural Survey Report for 4-SF-I-280 Transfer Concept," California Department of Transportation, Sacramento, California, 1983.

Spratt, Jerome D., "Status of the Pacific Herring, Clupea harengus pallasii, Resource in California, 1972 to 1980," California Department of Fish and Game, Fish Bulletin (171): 1-107, 1981.

State of California, Office of Planning and Research, 1987 California Permit Handbook, Sacramento, California, December, 1986.

Stebbins, R. C., A Field Guide to Western Reptiles and Amphibians, second edition, Revised, Houghton Mifflin, Boston, Massachusetts, 1966.

Steinbrugge, K. V. et al., Earthquake Planning Scenario for a Magnitude 7.5 Earthquake on the Hayward Fault in the San Francisco Bay Area, California Department of Conservation, Division of Mines and Geology, Special Publication 78, 1987.

Transportation Research Board, "Circular 212 Interim Materials on Highway Capacity," Washington, D.C., January 1980.

Triumph Marketing, "Market Evaluation and Projection (Task 1A -- Peninsula Freight Study)," prepared for Metropolitan Transportation Commission, Oakland, California, December 5, 1986.

Triumph Marketing, "Peninsula Freight Study, Report on Rail Trends," prepared for Metropolitan Transit Commission, Oakland, California, June, 1987.

Triumph Marketing, "Peninsula Freight Study, Task 4: Comparative Cost and Operating Analysis," prepared for Metropolitan Transit Commission, Oakland, California, April 10, 1987.

U.S. Army Corps of Engineers, "Dredge Disposal Study, San Francisco Bay and Estuary, Appendix F, Crystalline Matrix Study," U.S. Army Engineer District, San Francisco, California, 1975.

U.S. Coast Guard, "California Drawbridge Regulations: Governing the Operation of Drawbridges Across Navigable Waters of the United States in California," Washington D.C., April, 1986.

U.S. Coast Guard, Chemical Hazard Response Information System: Hazardous Chemical Data, Commandant Instruction M.16465.12A, Department of Transportation, 1984.

U.S. Code of Federal Regulations, Title 40, Chapter I, Part 300, "Natural Oil and Hazardous Substances Pollution Contingency Plan," 300.68, 7-1-86 edition.

U.S. Congress, Office of Technology Assessment, "Wastes in the Marine Environment," OTA-0-334, U.S. Government Printing Office, Washington D.C., April, 1987.

U.S. Department of Commerce, Bureau of the Census, County Business Patterns 1970, California, Washington, D.C., July, 1971.

U.S. Department of Commerce, Bureau of the Census, County Business Patterns 1982, California, Washington, D.C., October, 1984.

U.S. Department of Commerce, Bureau of the Census, County Business Patterns 1983, California, Washington, D.C., September 1985.

U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population and Housing: Census Tracts, San Francisco-Oakland, California, SMSA; Vallejo-Napa, California, SMSA; Santa Rosa, California, SMSA; and San Jose, California, SMSA; Washington, D.C., April, 1972.

U.S. Department of Commerce, Bureau of the Census, 1977 Census of Retail Trade, Major Retail Centers, California, Washington, D.C., March, 1980.

U.S. Department of Commerce, Bureau of the Census, 1977 Census of Service Industries, California, Washington, D.C., February, 1980.

U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Alphabetical Index of Industries and Occupations, Second Edition, Washington, D.C., May 1981.

U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population and Housing: Census Tracts, San Francisco-Oakland, California, SMSA; Vallejo-Fairfield-Napa, California, SMSA; Santa Rosa, California, SMSA; and San Jose, California; SMSA; Washington, D.C., July, 1983.

U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population: Journey-to-Work: Metropolitan Commuting Flows, Washington, D.C., April, 1984.

U.S. Department of Commerce, Bureau of the Census, 1982 Census of Retail Trade, Major Retail Centers, California, Washington, D.C., March 1985.

U.S. Department of Commerce, Bureau of the Census, 1982 Census of Service Industries, California, Washington, D.C., December, 1984.

U.S. Department of Commerce, Bureau of Economic Analysis, 1985 OBERS BEA Regional Projections, Volume 1, State Projections to 2035, Washington, D.C.

U.S. Department of Commerce, Bureau of Economic Analysis, 1985 OBERS BEA Regional Projections, Volume 2, Metropolitan Statistical Area Projections to 2035, Washington, D.C., 1985.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, "A Study of Earthquake Losses in the San Francisco Bay Area: Data and Analyses," prepared for California Office of Emergency Preparedness, Washington, D.C., 1972.

U.S. Department of Housing and Urban Development, The Noise Guidebook, Washington, D.C., March, 1985.

U.S. Department of the Interior, U.S. Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants," 50 CFR 17.11 and 17.12, Washington D.C., 1986.

U.S. Department of Labor, Bureau of Labor Statistics, Employment Projections for 1995, Bulletin 2197, Washington, D.C., March, 1984.

U.S. Department of Labor, Bureau of Labor Statistics, Employment Projections for 1995: Data and Methods, Bulletin 2253, Washington, D.C., April, 1986.

U.S. Department of Labor, Bureau of Labor Statistics, "The Employment Situation During 1986: Job Gains Continue, Unemployment Dips," Monthly Labor Review, Volume 11, Number 2, February, 1987.

U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review, Volume 107, Number 9, "Projections of the Economy, Labor Force and Occupational Change to the Year 2000," Washington, D.C., September, 1987.

U.S. Department of Labor, Bureau of Labor Statistics, Special Labor Force Report, Job Tenure and Occupational Change, 1981, Bulletin 2162, Washington, D.C., January 1983.

U.S. Department of the Navy, Western Division, Naval Facilities Engineering Command, Final EIS: Homeporting: Battleship Battlegroup/Cruiser Destroyer Group, prepared by Environmental Science Associates, Inc., San Francisco, California, July, 1987.

U.S. Department of Transportation, U.S. Coast Guard, "Bridge Permit Application Guide," Washington D.C., April, 1985.

U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Volume 1, fourth edition, EPA/OAP Pub. AP-42, Research Triangle Park, North Carolina, September, 1985.

U.S. Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, Report #550/9-74-004, Washington, D.C., March, 1974.

U.S. Environmental Protection Agency, "Quality Criteria for Water 1986," Office of Water Regulations and Standards, EPA 440/5-86-001, Washington, D.C., 1986.

U.S. Fish and Wildlife Service, U.S. Department of the Interior, "Endangered and Threatened Wildlife and Plants," 50 CFR 17.11 and 17.12, 1986.

University of California, Institute for Transportation Studies, "Bay Bridge Traffic Counts," Berkeley, California, Spring, 1985.

Verner, Jared, and Allan S. Boss, technical coordinators, "California Wildlife and Their Habitats: Western Sierra Nevada," General Technical Report PSW-37, Pacific Southwest Forest and Range Experiment Station, U.S. Department of Agriculture, U.S. Forest Service, Berkeley, California, 1980.

Verschueren, K., Handbook of Environmental Data on Organic Chemicals, second edition, Van Nostrand Reinhold Company, New York, 1983.

Wahrhaftig, Clyde, A Streetcar to Subduction and Other Plate Tectonic Trips by Public Transport in San Francisco, Revised Edition, American Geophysical Union, Washington D.C., 1984.

Weiss, G., Ed., Hazardous Chemical Data Book, Environmental Health Review No. 4, Noyes Data Corp., Park Ridge, N.J., 1980.

Wells Fargo Bank, "San Francisco - Its Economic Future," San Francisco, California, June, 1987.

Wetlands Research Associates, Inc., "Sources and Causes of Odor Problems in the San Francisco Bay Area, with Special Concern to the Potential for Odor Problems at the Mission Bay Open Space Element: Wetland Creation," Working Document #5, San Francisco, California, 1986.

Williams, P.B., "An Overview of the Impact of Accelerated Sea Level Rise on San Francisco Bay," San Francisco, California, December 20, 1985.

Williams, Philip, J. Haltiner and C.C. White, Jr., "Preliminary Analysis of Circulation Design for Mission Bay Project," San Francisco, California, 1986.

Wirth Associates, Inc., "Potrero 7 Phase I: Cultural Resources Overview and History," Pacific Gas & Electric Company, San Francisco, California, 1979.

World Health Organization, Health Hazards of the Human Environment, Geneva, Switzerland, 1972.

Young, J., "San Francisco: A History of the Pacific Coast Metropolis, Volume 1," The S. J. Clarke Publishing Company, San Francisco, California, 1912.

REPORT OUTLINE

III. BACKGROUND AND AREA DESCRIPTION

Page

LOCATION IN CITY AND REGION III.1

HISTORY OF THE PROJECT AREA III.1

  EARLY DEVELOPMENT OF MISSION BAY III.1

  PREVIOUS DEVELOPMENT PROPOSALS FOR MISSION BAY III.3

  THE MISSION BAY PLAN - PROPOSAL FOR CITIZEN REVIEW III.4

ENVIRONMENTAL DOCUMENTATION III.5

  OBJECTIVES OF THIS EIR III.5

  DRAFT AND FINAL EIR III.5

DESCRIPTION OF MISSION BAY PROJECT AREA III.6

  SUBAREAS III.6

  LAND OWNERSHIP III.8

AREAS SURROUNDING MISSION BAY III.8

  NOTES - Background and Area Description III.10

IV. STUDY APPROACH AND ORGANIZATION

Page

STUDY APPROACH IV.2

ALTERNATIVES IV.2

PERSPECTIVES FOR IMPACT ASSESSMENT IV.3

GEOGRAPHIC AREAS IV.4

Downtown & Vicinity IV.4
Nearby Areas IV.4

ANALYSIS YEARS IV.7

Setting IV.7
Future Context IV.7
Comments on Future Analysis Years IV.8

GROWTH SCENARIOS FOR IMPACT ASSESSMENT IV.10

RELATIONSHIP TO DOWNTOWN PLAN EIR IV.12

ORGANIZATION OF THE REPORT IV.12

NOTE - Study Approach and Organization IV.13

V. THE EIR ALTERNATIVES AND APPROVAL PROCESS

Page

GENERAL DESCRIPTION OF LAND USES V.1

COMMERCIAL V.2

Office V.2
Service/Light Industrial/Research and Development (S/LI/RD) V.2
Retail V.3
Hotel V.4
M-2 Industrial V.4
Port-Related/M-2 V.4

RESIDENTIAL V.5

COMMUNITY FACILITIES V.6

OPEN SPACE V.6

EXISTING USES INCORPORATED INTO THE ALTERNATIVES V.7

Houseboats V.7
Pleasure Craft V.7
CalTrain Station V.7
Pump Station V.7

I-280 TRANSFER CONCEPT PROGRAM V.7

CHARACTERIZATION OF THE ALTERNATIVES V.8

ALTERNATIVE A V.11

North of the Channel V.11
West of Third Street V.11
East of Third Street V.13

ALTERNATIVE B V.13

North of the Channel V.15
West of Third Street V.15
East of Third Street V.16

ALTERNATIVE N - NO PROJECT V.16

North of the Channel V.17
West of Third Street V.19
East of Third Street V.19

Page

BUSINESS ACTIVITY, EMPLOYMENT, HOUSING, AND POPULATION V.28

DEVELOPMENT PATTERN FOR THE INTERIM ANALYSIS YEAR (2000) V.29

Initial Phase of Development V.29

BUSINESS ACTIVITY AND EMPLOYMENT V.33

2000 V.36
Build-Out/2020 V.37

HOUSING AND POPULATION: 2000 AND BUILD-OUT/2020 V.38

APPROVAL PROCESS V.40

ENVIRONMENTAL REVIEW, MASTER PLAN AMENDMENTS AND REZONING V.40

OTHER CITY PERMITS AND APPROVAL PROCESSES V.41

REGIONAL, STATE, AND FEDERAL APPROVALS V.42

NOTES - The EIR Alternatives and Approval Process V.43

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
A. PUBLIC PLANS, POLICIES, AND PERMITS

Page

SETTING VI.A.1

LOCAL AGENCIES VI.A.1

City and County of San Francisco VI.A.1

The San Francisco Master Plan VI.A.1
Central Waterfront Plan VI.A.2
Other Subareas. VI.A.5

Adopted Plans Affecting Nearby Areas VI.A.5
Northeastern Waterfront Plan. VI.A.5
Rincon Hill Plan. VI.A.6
The Rincon Point - South Beach Redevelopment Plan. VI.A.6
Yerba Buena Center Redevelopment Plan. VI.A.8
Downtown Plan. VI.A.8
South Bayshore Plan. VI.A.9

Proposals for Citizen Review Affecting Nearby Areas VI.A.9
South of Market Plan. VI.A.9

San Francisco Master Plan Elements VI.A.10
Commerce and Industry Element. VI.A.10
Residence Element. VI.A.10
Transportation Element. VI.A.11
Urban Design Element. VI.A.11
Recreation and Open Space Element. VI.A.11
Community Facilities Element. VI.A.12
Environmental Protection Element. VI.A.12
Energy Element. VI.A.12
Community Safety Element. VI.A.12

Project Review and Approvals VI.A.13
San Francisco City Planning Code and Zoning Map. VI.A.13
Height and Bulk Districts. VI.A.14
Environmental Review Process. VI.A.15
Other City Agency Review and Approvals. VI.A.15
Development Agreement. VI.A.16

Port of San Francisco VI.A.16

Conceptual Maritime Master Plan VI.A.18
San Francisco Bay Area Seaport Plan VI.A.18
Current Capital Improvement Programs VI.A.20

Page

REGIONAL AGENCIES VI.A.20

San Francisco Bay Conservation and Development Commission VI.A.20

McAteer-Petris Act VI.A.20
San Francisco Bay Plan VI.A.21
San Francisco Waterfront Special Area Plan VI.A.22
San Francisco Bay Area Seaport Plan VI.A.23

Metropolitan Transportation Commission VI.A.23

Regional Transportation Plan VI.A.23
Transportation Improvement Program VI.A.24
San Francisco Bay Area Seaport Plan VI.A.24
Peninsula Mass Transit Study and Proposed Joint Powers Agreement VI.A.25

San Francisco Bay Regional Water Quality Control Board VI.A.26
Bay Area Air Quality Management District VI.A.26
Association of Bay Area Governments VI.A.27

STATE AGENCIES VI.A.28

California State Lands Commission VI.A.28
California Public Utilities Commission VI.A.29
California Department of Transportation VI.A.29
CalTrain Peninsula Commute Service Plan VI.A.29
Removal of the I-280 Freeway Stub VI.A.30
California Department of Fish and Game VI.A.30
Department of Health Services VI.A.31

FEDERAL AGENCIES VI.A.31

U.S. Army Corps of Engineers VI.A.31
U.S. Coast Guard VI.A.32
U.S. Fish and Wildlife Service VI.A.32
National Marine Fisheries Service VI.A.33
U.S. Environmental Protection Agency VI.A.33

COMPARISON WITH ALTERNATIVES VI.A.34

LOCAL AGENCIES VI.A.34

City and County of San Francisco VI.A.34

Central Waterfront Plan VI.A.34
Alternative A. VI.A.41
Alternative B. VI.A.42
Alternative N. VI.A.43

Page

Adopted Plans and Proposals for Citizen Review Affecting Nearby Areas VI.A.43
Alternative A VI.A.44
Northeastern Waterfront Plan. VI.A.44
Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan. VI.A.44
South of Market Plan. VI.A.44
Alternative B VI.A.45
Northeastern Waterfront Plan. VI.A.45
Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan. VI.A.45
South of Market Plan. VI.A.45
Alternative N VI.A.46
Northeastern Waterfront Plan. VI.A.46
Rincon Hill Plan and Rincon Point - South Beach Redevelopment Plan. VI.A.46
South of Market Plan. VI.A.46
San Francisco Master Plan Elements VI.A.47
Review and Approvals VI.A.47
San Francisco Planning Code and Zoning Map. VI.A.47
Alternative A. VI.A.52
Alternative B. VI.A.52
Alternative N. VI.A.52
San Francisco Health Code. VI.A.53

Port of San Francisco VI.A.53
Alternative A VI.A.55
Alternative B VI.A.56
Alternative N VI.A.57

REGIONAL AGENCIES VI.A.57

San Francisco Bay Conservation and Development Commission VI.A.57
Alternative A VI.A.58
Alternative B VI.A.59
Alternative N VI.A.59
Metropolitan Transportation Commission VI.A.60
Regional Water Quality Control Board VI.A.60
Hazardous Materials VI.A.61
Bay Area Air Quality Management District VI.A.61

STATE AGENCIES VI.A.62

State Lands Commission VI.A.62
Alternative A VI.A.62
Alternative B VI.A.62
Alternative N VI.A.62
California Public Utilities Commission VI.A.63
California Department of Transportation VI.A.63
California Department of Fish and Game VI.A.63
Department of Health Services VI.A.64

Page

FEDERAL AGENCIES VI.A.64

U.S Army Corps of Engineers VI.A.64
U.S. Coast Guard VI.A.64
U.S. Fish and Wildlife Service VI.A.65
National Marine Fisheries Service VI.A.65

PERMITS VI.A.65

Local Agencies VI.A.66
City and County of San Francisco VI.A.66
Regional Agencies VI.A.66
Bay Conservation and Development Commission VI.A.66
State Agencies VI.A.68
California Department of Transportation VI.A.68
Federal Agencies VI.A.70
U.S. Army Corps of Engineers VI.A.70
United States Coast Guard VI.A.71

NOTES - Public Plans, Policies and Permits VI.A.72

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
B. LAND USE, BUSINESS ACTIVITY, AND EMPLOYMENT

Page

SETTING VI.B.1

LAND USE, BUSINESS ACTIVITY AND EMPLOYMENT VI.B.1

Mission Bay Project Area VI.B.1

Land Use VI.B.2
Land Area by Use. VI.B.2
Building Space and Land Area Used by Businesses. VI.B.2
Business Activity VI.B.6
Establishments and Employment by Business Activity. VI.B.6
Rail Freight Users. VI.B.8
Commuter-Rail Operations. VI.B.8
Maritime-Related Activities. VI.B.9
Trends in Activity in the Project Area VI.B.11
Houseboats and Pleasure Craft VI.B.13

Downtown & Vicinity VI.B.13

Space by Use VI.B.13
Employment by Business Activity and by Subarea VI.B.16

Citywide and Regional Context VI.B.17

Comparison of Employment in the Downtown & Vicinity to Citywide Employment VI.B.17
Employment in San Francisco VI.B.19
San Francisco Within the Bay Area Region VI.B.21

Economic Trends VI.B.22

San Francisco and the Rest of the Region VI.B.22
San Francisco's Downtown & Vicinity VI.B.23
Changes in Economic Activity in the Downtown & Vicinity. VI.B.23
Downtown Office Context - The Early 1980s. VI.B.25
Downtown Office Context-Beyond 1985. VI.B.26
Proposition M. VI.B.27
Outlook for Other Sectors. VI.B.27

Nearby Areas VI.B.28

Employment Overview VI.B.29
South of Market / Showplace Square VI.B.29
South of Market. VI.B.29
Showplace Square. VI.B.31
North Potrero / Potrero Hill VI.B.32
Lower Potrero / Central Bayfront VI.B.33
Inner Mission VI.B.35

Page

South Bayshore VI.B.35
Maritime Activities and the Piers Adjacent to the Project Area VI.B.36
Overview of Port Facilities and Waterfront Activity. VI.B.36
Use of Port Property Adjacent to the Mission Bay Project Area. VI.B.37

JOBS AND LABOR FORCE CHARACTERISTICS VI.B.38

Characteristics of Jobs in the Mission Bay Project Area VI.B.38
Characteristics of Jobs in the Downtown & Vicinity VI.B.40
Occupations VI.B.40
Wage/Salary Distribution VI.B.42
Job Opportunities VI.B.43
Comparison of Jobs in the Downtown & Vicinity to Jobs in the Rest of the City VI.B.43
The Labor Pool VI.B.45
City Jobs Attract Labor from Throughout the Region VI.B.45
City Jobs Employ a Large Share of City Residents VI.B.45
The Unemployed in the Labor Pool VI.B.48

FUTURE CONTEXT VI.B.50

COMMENTS ON APPROACH AN FORECASTS VI.B.51

FUTURE SCENARIOS VI.B.53

2000 VI.B.53
Downtown & Vicinity VI.B.53
Employment Forecasts by Business Activity. VI.B.53
Employment for Subareas of the Downtown & Vicinity. VI.B.57
Comparison to Forecasts in the Downtown Plan EIR. VI.B.59
Space by Use in the Downtown & Vicinity. VI.B.60
Relationship of Office Forecasts to Proposition M Limit on Office Development Approvals. VI.B.63

Citywide Employment VI.B.63
Overview. VI.B.63
Employment and Business Activity in the Rest of the City Outside the Downtown & Vicinity. VI.B.65
Nearby Industrial Areas. VI.B.65
Maritime Activities. VI.B.66
Employment Differences Between the Scenarios for Each Alternative. VI.B.67
Comparison to Other Forecasts. VI.B.67

Regional Context VI.B.68
Build-Out/2020 VI.B.69
Downtown & Vicinity VI.B.70
Citywide Employment VI.B.76
Regional Context VI.B.78

Page

IMPACT VI.B.80

MISSION BAY PROJECT AREA VI.B.81

Comparison of the Land Use Characteristics of the Alternatives VI.B.81
2000 VI.B.81
Build-Out/2020 VI.B.82
Alternative A. VI.B.82
Alternative B. VI.B.82
Alternative N. VI.B.82

Implications for Employment and Job Opportunities in Mission Bay VI.B.83

Permanent Employment VI.B.83
2000. VI.B.83
Build-Out/2020. VI.B.85
Alternative A. VI.B.85
Alternative B. VI.B.87
Alternative N. VI.B.87
Construction Employment VI.B.88
2000. VI.B.88
Build-Out/2020. VI.B.89

Employment Benefits to the Labor Force VI.B.91

2000 VI.B.92
Build-Out/2020 VI.B.92
Alternative A. VI.B.92
Alternative B. VI.B.92
Alternative N. VI.B.92

Implications for Existing Land Uses in Mission Bay VI.B.93

Overview of Project Area Business Transition and Location Options VI.B.93
2000 VI.B.96
Alternative A. VI.B.96
Initial Phase of Development. VI.B.97
Alternative B. VI.B.98
Initial Phase of Development. VI.B.98
Alternative N. VI.B.98
Build-Out/2020 VI.B.99
Alternative A. VI.B.99
Alternative B. VI.B.99
Alternative N. VI.B.100

Maritime-Related Activity/Port-Related Land Use VI.B.101

Build-Out/2020 VI.B.101
Alternative A. VI.B.101
Alternative B. VI.B.102
Alternative N. VI.B.103

Page

Retail Activity VI.B.104

Build-Out/2020 VI.B.104
  Alternative A. VI.B.104
  Alternative B. VI.B.105
  Alternative N. VI.B.106

IMPLICATIONS FOR NEARBY AREAS VI.B.106

2000 VI.B.107

Initial Phase of Development VI.B.108

Build-Out/2020 VI.B.108

South of Market and Other Parts of the Downtown & Vicinity VI.B.109
  Alternative A. VI.B.109
  Alternative B. VI.B.110
  Alternative N. VI.B.111
Showplace Square, North Potrero / Potrero Hill and Inner Mission VI.B.112
  Alternative A. VI.B.113
  Alternative B. VI.B.113
  Alternative N. VI.B.113
Lower Potrero / Central Bayfront, Inner Mission, and South Bayshore VI.B.113
  Alternative A. VI.B.114
  Alternative B. VI.B.114
  Alternative N. VI.B.115
Piers Adjacent to Mission Bay and Consideration of Future Maritime Activity VI.B.115
  Alternative A. VI.B.115
  Alternative B. VI.B.117
  Alternative N. VI.B.117
Consideration of Retail Activity VI.B.117
  Alternative A. VI.B.118
  Alternative B. VI.B.119
  Alternative N. VI.B.119

IMPLICATIONS FOR CITYWIDE AND REGIONAL GROWTH AND DEVELOPMENT PATTERNS VI.B.119

2000 VI.B.121

Build-Out/2020 VI.B.121
  Alternative A VI.B.121
  Alternative B VI.B.122
  Alternative N VI.B.123

MITIGATION VI.B.124

NOTES – Land Use, Business Activity, and Employment VI.B.126

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
C. HOUSING AND POPULATION

Page

SETTING VI.C.1

HOUSING MARKET CONDITIONS IN SAN FRANCISCO AND THE REGION VI.C.1

- Regional Housing Market Context VI.C.1
- Housing Affordability VI.C.3
- Housing Market Conditions in San Francisco VI.C.4
  - Overview VI.C.4
  - Housing Market Indicators VI.C.4
  - Pressures on the Existing Housing Stock VI.C.6

POPULATION AND DEMOGRAPHICS: CITYWIDE AND REGIONAL CONTEXT VI.C.6

- San Francisco VI.C.6
- Rest of Region VI.C.9
- San Francisco in the Regional Context VI.C.9

POPULATION AND HOUSING: DOWNTOWN & VICINITY AND THE PROJECT AREA VI.C.11

- Population and Households in the Downtown & Vicinity VI.C.11
- Mission Bay Project Area VI.C.15

POPULATION AND HOUSING: NEARBY AREAS VI.C.16

- Overview VI.C.16

- South of Market VI.C.17
  - Overview VI.C.17
  - Population VI.C.17
  - Housing Stock VI.C.19

- Potrero Hill VI.C.19
  - Overview VI.C.19
  - Population VI.C.20
  - Housing Stock VI.C.21

- Lower Potrero / Central Bayfront VI.C.21
  - Overview VI.C.21
  - Population VI.C.22
  - Housing Stock VI.C.23

- More-Distant Residential Areas VI.C.24
  - Inner Mission VI.C.24
  - South Bayshore VI.C.25

Page

JOBS/HOUSING RELATIONSHIP VI.C.26

Overall Relationship Between Jobs and Housing in San Francisco VI.C.27
Jobs and Employed Residents VI.C.27
Residents Working in San Francisco Compared to All Employed City Residents VI.C.27
Residents Working in San Francisco Compared to City Jobs VI.C.27
Residence Patterns of Workers in the Downtown & Vicinity VI.C.29
Residence Patterns Among Counties of the Region VI.C.29
Residence Patterns Within San Francisco VI.C.31
Places of Work of Residents of the Downtown & Vicinity VI.C.31

FUTURE CONTEXT VI.C.36

METHODOLOGY AND UNDERLYING ASSUMPTIONS VI.C.37

HOUSING AND POPULATION VI.C.38

2000 VI.C.38
Citywide Context VI.C.38
Housing Units and Households. VI.C.38
Population. VI.C.40
Employed Population. VI.C.41
Distribution of Housing and Population Within the City VI.C.42
Regional Context VI.C.44

Build-out/2020 VI.C.46
Citywide Context VI.C.46
Regional Context VI.C.49

RELATIONSHIP BETWEEN EMPLOYMENT AND EMPLOYED POPULATION VI.C.51

Regional and Citywide Relationships Between Employment and Employed Population: 2000 and Build-out/2020 VI.C.51
Regional Perspective VI.C.52
Citywide Perspective VI.C.53
Jobs and Employed Residents In San Francisco. VI.C.53
City Residents Working in San Francisco. VI.C.55
Residents of the Rest of the Region Working in San Francisco. VI.C.55

Residence Patterns of Workers in the Downtown & Vicinity VI.C.55
2000 VI.C.57
San Francisco Compared to the Rest of the Region. VI.C.57
Distribution Within the Region. VI.C.59
Distribution Within San Francisco. VI.C.60

Build-out/2020 VI.C.60
San Francisco Compared to the Rest of the Region. VI.C.60

Page

Distribution Within the Region. VI.C.62
Distribution Within San Francisco. VI.C.62

Places of Work for Residents of the Downtown & Vicinity VI.C.63
2000 and Build-out/2020 VI.C.63

IMPACT VI.C.64

IMPLICATIONS FOR HOUSEHOLDS AND POPULATIONS IN THE PROJECT AREA VI.C.64

2000 VI.C.66
Build-Out/2020 VI.C.66
Alternative A VI.C.66
Alternative B VI.C.66
Alternative N VI.C.67

RELATIONSHIP BETWEEN PROJECT AREA EMPLOYMENT GROWTH AND HOUSING DEVELOPMENT VI.C.67

Approach VI.C.68
Office Affordable Housing Production Program (OAHPP) VI.C.68
Overall Jobs/Housing Mix VI.C.68
Consideration of Housing Affordability VI.C.69

Comparison of Alternatives at Full Development VI.C.70
Build-Out/2020 VI.C.70
Alternative A. VI.C.70
Alternative B. VI.C.75
Alternative N. VI.C.76

Phasing of Employment Growth and Housing Development and Comparison of Alternatives at Interim Analysis Year VI.C.77
2000 VI.C.77
Alternative A. VI.C.77
Initial Phase of Development. VI.C.80
Alternative B. VI.C.80
Initial Phase of Development. VI.C.80
Alternative N. VI.C.80

IMPLICATIONS FOR CITYWIDE HOUSING MARKET CONDITIONS VI.C.81

2000 VI.C.81
Initial Phase of Development VI.C.81

Build-Out/2020 VI.C.81
Mission Bay One of Many Factors Affecting Future Citywide Housing Market Conditions VI.C.81
Implications of Cumulative Growth for Future Housing Market Conditions VI.C.83

Page

Comparison of Alternatives VI.C.84
  Alternative A. VI.C.85
  Alternative B. VI.C.85
  Alternative N. VI.C.86

IMPLICATIONS FOR NEARBY AREAS VI.C.86

2000 VI.C.87
  Initial Phase of Development VI.C.88
Build-Out/2020 VI.C.88
  South of Market VI.C.88
    Alternative A. VI.C.89
    Alternative B. VI.C.89
    Alternative N. VI.C.90
  Lower Potrero / Potrero Hill VI.C.90
    Alternative A. VI.C.90
    Alternative B. VI.C.91
    Alternative N. VI.C.91
  More-Distant Residential Areas VI.C.92

IMPLICATIONS FOR THE HOUSING MARKET IN THE REST OF THE REGION VI.C.92

2000 and Build-Out/2020 VI.C.93
  Regional Perspective on Jobs and Housing in Mission Bay VI.C.93
  Contribution of Employment in the Downtown & Vicinity to Regional Housing Market VI.C.94

MITIGATION VI.C.98

NOTES - Housing and Population VI.C.99

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
D. COMMUNITY SERVICES AND INFRASTRUCTURE

Page

SETTING VI.D.1

FIRE PROTECTION VI.D.1

- Citywide and Mission Bay Service VI.D.1
- Water Supply VI.D.4
- Fire Safety Ordinances VI.D.5
- Hazardous Materials Responses VI.D.5

POLICE PROTECTION VI.D.6

Crime Statistics VI.D.8

SCHOOLS VI.D.9

- San Francisco Unified School District VI.D.9
- Private Schools VI.D.10
- Public School Students Living in the Project Area and Adjacent Nearby Areas VI.D.10
- Public Schools Located in Nearby Areas Adjacent to Mission Bay VI.D.10

RECREATION AND PARKS VI.D.11

- Existing Project Area Open Space and Recreation Facilities VI.D.11
- Existing Nearby Parks, Open Space Areas and Recreation Facilities VI.D.13
  - Shoreline Parks and Open Spaces VI.D.13
  - Waterfront Restaurants VI.D.13
  - Boating Facilities VI.D.14
  - Parks VI.D.14
  - Recreation and Senior Centers VI.D.14
- Plans and Policies VI.D.15
  - San Francisco Master Plan VI.D.15
    - Recreation and Open Space Element. VI.D.15
    - Central Waterfront Plan. VI.D.16
  - Bay Conservation and Development Commission VI.D.16

LIBRARIES VI.D.17

PUBLIC HEALTH SERVICES VI.D.18

- Emergency Medical Services VI.D.18
- Community Public Health Program - Environmental Health Services VI.D.19
- Toxics Control Management Program VI.D.19
- Community Mental Health Services VI.D.20
- Other DPH Programs VI.D.21

Page

- WATER SUPPLY VI.D.22
  - Citywide System VI.D.22
  - Mission Bay VI.D.22
- SEWERS AND WASTEWATER TREATMENT VI.D.24
  - Citywide Facilities VI.D.24
  - Mission Bay VI.D.25
- SOLID WASTE DISPOSAL VI.D.28
  - Citywide System VI.D.28
  - Mission Bay VI.D.29
- STREETS VI.D.29
  - Maintenance VI.D.30
  - Ownership VI.D.30
  - Street Vacation Petition Process VI.D.31

IMPACT VI.D.32

- FIRE PROTECTION VI.D.32
  - Service Demand Issues VI.D.32
    - Threshold Level of Service VI.D.33
    - Water Supply VI.D.33
    - Station Capacity and Response Times VI.D.33
    - Potential Hazards VI.D.34
      - New Potential Fire Hazards. VI.D.34
      - Potential Earthquake Hazards. VI.D.34
      - Hazardous Materials. VI.D.34
  - 2000 VI.D.34
    - Initial Phase of Development VI.D.35
    - Alternative A VI.D.36
    - Alternative B VI.D.37
    - Alternative N VI.D.38
  - Build-Out/2020 VI.D.38
    - Alternative A VI.D.39
    - Alternative B VI.D.40
    - Alternative N VI.D.41
- POLICE PROTECTION VI.D.41
  - Service Demand Issues VI.D.41
    - Police Stations VI.D.43
    - Potential Earthquake Hazards VI.D.44

Page

2000 VI.D.44
- Alternative A VI.D.45
  - Initial Phase of Development. VI.D.45
- Alternative B VI.D.45
  - Initial Phase of Development. VI.D.46
- Alternative N VI.D.46

Build-Out/2020 VI.D.46
- Alternative A VI.D.47
- Alternative B VI.D.48
- Alternative N VI.D.48

SCHOOLS VI.D.49

2000 VI.D.49
- Public School Enrollment Citywide VI.D.49
- Public School Students Living in Adjacent Nearby Areas VI.D.50
- Public Schools Located in Nearby Areas Adjacent to Mission Bay VI.D.50
- Project Area Public School Students and Space and Teacher Requirements VI.D.51
- Alternative A VI.D.52
  - Initial Phase of Development. VI.D.54
- Alternative B VI.D.54
  - Initial Phase of Development. VI.D.54
- Alternative N VI.D.54

Build-Out/2020 VI.D.55
- Public School Enrollment Citywide VI.D.55
- Public School Students Living in Adjacent Nearby Areas VI.D.55
- Project Area Public School Students and Space and Teacher Requirements VI.D.56
- Alternative A VI.D.56
- Alternative B VI.D.59
- Alternative N VI.D.60

Project Area School Locations VI.D.60
- Alternative A VI.D.60
- Alternative B VI.D.60
- Alternative N VI.D.61

RECREATION AND PARKS VI.D.61

- Public Plans and Policies VI.D.65

2000 VI.D.65
- Project Area Open Space VI.D.65
- Personnel Requirements VI.D.65
- Project Area Open Space Demand VI.D.68
- Open Space Needs in Nearby Areas VI.D.70
- Alternative A VI.D.72
  - Initial Phase of Development. VI.D.73

Page

Alternative B VI.D.74
Initial Phase of Development. VI.D.75
Alternative N VI.D.75

Build-Out/2020 VI.D.76
Project Area Open Space VI.D.76
Personnel Requirements VI.D.76
Project Area Open Space Demand VI.D.79
Open Space Needs in Nearby Areas VI.D.79
Alternative A VI.D.82
Alternative B VI.D.83
Alternative N VI.D.85
Public Plans and Policies VI.D.86

LIBRARIES VI.D.86

2000 VI.D.92
Alternative A VI.D.92
Initial Phase of Development. VI.D.92
Alternative B VI.D.92
Initial Phase of Development. VI.D.92
Alternative N VI.D.92

Build-Out/2020 VI.D.93
Alternative A VI.D.93
Alternative B VI.D.93
Alternative N VI.D.93

PUBLIC HEALTH SERVICES VI.D.93

Community Public Health Program - Environmental Health Services VI.D.94
Hazardous Materials VI.D.94
Rodent Control VI.D.94

Hospital Administration VI.D.94
Water Quality VI.D.94
Homeless Population VI.D.95

2000 VI.D.95
Emergency Medical Services VI.D.95
Community Mental Health Services VI.D.95
Alternative A VI.D.97
Initial Phase of Development. VI.D.97
Alternative B VI.D.98
Initial Phase of Development. VI.D.98
Alternative N VI.D.98

Build-Out/2020 VI.D.98
Alternative A VI.D.98
Alternative B VI.D.100
Alternative N VI.D.100

Page

WATER SUPPLY VI.D.100

2000 VI.D.100
  Citywide System VI.D.100
  Mission Bay VI.D.101
  Alternative A VI.D.102
    Initial Phase of Development. VI.D.102
  Alternative B VI.D.102
    Initial Phase of Development. VI.D.102
  Alternative N VI.D.102

Build-Out/2020 VI.D.103
  Alternative A VI.D.103
  Alternative B VI.D.103
  Alternative N VI.D.103

SEWERS AND WASTEWATER TREATMENT VI.D.104

  Sewage Generation VI.D.104

  2000 VI.D.104
    Infrastructure VI.D.105
    Treatment and Collection VI.D.105
    Effluent Water Quality VI.D.105
    Alternative A VI.D.106
      Initial Phase of Development. VI.D.106
    Alternative B VI.D.106
      Initial Phase of Development. VI.D.107
    Alternative N VI.D.107

  Build-Out/2020 VI.D.107
    Alternative A VI.D.107
    Alternative B VI.D.108
    Alternative N VI.D.108

SOLID WASTE DISPOSAL VI.D.108

  2000 VI.D.108
    Alternative A VI.D.110
      Initial Phase of Development. VI.D.110
    Alternative B VI.D.110
      Initial Phase of Development. VI.D.110
    Alternative N VI.D.111

  Build-Out/2020 VI.D.111
    Alternative A VI.D.111
    Alternative B VI.D.111
    Alternative N VI.D.111

Page

STREETS VI.D.112

2000 VI.D.112
  Project Area Roadway Network and Sidewalks and Pedestrian Areas VI.D.112
  Design and Maintenance VI.D.112
  Ownership VI.D.113
  Alternative A VI.D.113
  Alternative B VI.D.114
  Alternative N VI.D.114

Build-Out/2020 VI.D.114

MITIGATION VI.D.115

FIRE PROTECTION VI.D.115

POLICE PROTECTION VI.D.116

SCHOOLS VI.D.117

RECREATION AND PARKS VI.D.118

PUBLIC HEALTH VI.D.119

WATER SUPPLY VI.D.119

SEWER VI.D.120

SOLID WASTE VI.D.120

NOTES – Community Services and Infrastructure VI.D.121

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
E. TRANSPORTATION

Page

SETTING VI.E.1

EXISTING PROJECT AREA TRANSPORTATION FACILITIES AND SERVICES VI.E.1

Nearby Regional Transportation Systems VI.E.1

Project Area Roadway Network VI.E.2
- Traffic Volumes at Project Area Intersections and Freeway Access Points VI.E.7
- Intersection Operating Conditions VI.E.11

Movable Bridges on China Basin Channel VI.E.13

Project Area Transit Facilities and Services VI.E.14
- MUNI VI.E.14

Maritime Activities VI.E.18
- Maritime-Related Traffic Volumes VI.E.19

Rail Freight Facilities and Services VI.E.20
- Southern Pacific Transportation Company VI.E.20
- Atchison, Topeka and Santa Fe Railway Company VI.E.22
- San Francisco Belt Railroad VI.E.24
- Western Pacific Railroad VI.E.25

Rail Freight Traffic VI.E.25

Pedestrian and Bicycle Travel VI.E.27

Parking Conditions VI.E.29

REGIONAL TRANSPORTATION FACILITIES VI.E.31

Transit Operating Conditions at Screenlines VI.E.34
- MUNI VI.E.34
- CalTrain VI.E.36
- BART VI.E.37
- AC Transit VI.E.38
- SamTrans VI.E.38
- Golden Gate Transit VI.E.39

Operating Conditions for Freeways and Bridges VI.E.39
- San Francisco - Oakland Bay Bridge VI.E.40
- Golden Gate Bridge VI.E.41
- U.S. 101 and I-280 VI.E.42

Page

EXISTING TRANSPORTATION PLANS, POLICIES, AND PROGRAMS VI.E.43

Regional Land Use and Transportation Issues VI.E.43

Transit VI.E.45
CalTrain VI.E.45
MUNI Rail VI.E.46
MUNI Bus / Trolley VI.E.47

Streets and Highways VI.E.48

Maritime and Related Activities VI.E.49

Pedestrian and Bicycle Facilities VI.E.49

IMPACT VI.E.50

CONTEXT FOR THE ANALYSIS VI.E.50

IMPACT CONCLUSIONS VI.E.52

2000 VI.E.53

2020 VI.E.54

REGIONAL AND CITYWIDE TRANSPORTATION FACILITIES AND SERVICES VI.E.56

2000 VI.E.56
Regional Highways VI.E.57
Regional and Citywide Transit Facilities VI.E.57

Build-Out/2020 VI.E.58

PROJECT-LEVEL TRANSPORTATION FACILITIES AND SERVICES VI.E.59

Roadway Networks VI.E.60

Transit Facilities and Services VI.E.61
CalTrain (Peninsula Commute Service) VI.E.61
MUNI Metro VI.E.62
MUNI Bus Routes VI.E.63

Maritime Facilities and Services VI.E.67

Rail Freight Facilities and Services VI.E.68
Alternative N VI.E.68
Alternatives A and B VI.E.69

Parking VI.E.70

Pedestrian and Bicycle Facilities VI.E.71

Page

TRAVEL FORECASTING APPROACH VI.E.71

Cumulative Travel Components VI.E.72

Travel Forecasting Model VI.E.72
- Travel To and From the Downtown & Vicinity VI.E.73
- Travel To and From San Francisco Areas Not Included in the Downtown & Vicinity VI.E.74
- Travel To and From Other Parts of the Region VI.E.74

Forecasts of 2000 and 2020 Travel VI.E.74
- Modal Shifts VI.E.76
  - East Bay Screenline. VI.E.78
  - North Bay Screenline. VI.E.78
  - South Bay Screenline. VI.E.79
  - San Francisco Screenlines. VI.E.79
- Other Factors Affecting the Travel Forecasts VI.E.80
- Relation Between Travel Forecasts for the Downtown & Vicinity and the Project Area VI.E.82

IMPACT ANALYSIS AND RESULTS VI.E.83

YEAR 2000 SCREENLINE TRAVEL EFFECTS/76/ VI.E.84

Highways VI.E.85
- Golden Gate Bridge VI.E.85
- San Francisco - Oakland Bay Bridge VI.E.89
- U.S. 101 at the San Mateo County Line VI.E.91
- I-280 at the San Mateo County Line VI.E.92

Transit Systems VI.E.93
- MUNI Screenlines Within San Francisco VI.E.93
- Golden Gate Transit - Buses VI.E.99
- Golden Gate Transit - Ferries VI.E.99
- BART - TransBay VI.E.100
- AC Transit VI.E.100
- CalTrain, BART (South Bay), and SamTrans VI.E.101
- Levels of Transit Service VI.E.103

BUILD-OUT/2020 SCREENLINE TRAVEL EFFECTS VI.E.104

Highways VI.E.105
- Golden Gate Bridge VI.E.110
- San Francisco - Oakland Bay Bridge VI.E.111
- U.S. 101 at the San Mateo County Line VI.E.113
- I-280 at the San Mateo County Line VI.E.114

Page

Transit Systems VI.E.114
  MUNI Screenlines Within San Francisco VI.E.123
  Golden Gate Transit - Buses VI.E.124
  Golden Gate Transit - Ferries VI.E.125
  BART - TransBay VI.E.126
  AC Transit VI.E.126
  CalTrain, BART (South Bay) and SamTrans VI.E.127
  Levels of Transit Service VI.E.129

OTHER POINTS OF REGIONAL CONGESTION VI.E.133

Other Points of Regional Travel Congestion VI.E.133
  Highway Congestion VI.E.135
  Possible Transit Capacity Constraints VI.E.139

PROJECT AREA IMPACTS, 2000 VI.E.140

Street Intersections VI.E.140

Transit VI.E.148

Rail Freight Facilities VI.E.152
  Alternative A VI.E.153
  Alternative B VI.E.156
  Alternative N VI.E.156

Maritime Facilities and Services VI.E.156
  Alternative A VI.E.158
  Alternatives B and N VI.E.158

Parking VI.E.158
  Parking Supply VI.E.159
  Parking Demand VI.E.162
    Alternative A. VI.E.163
    Alternative B. VI.E.164
    Alternative N. VI.E.164
Pedestrians and Bicycles VI.E.164

PROJECT AREA IMPACTS, BUILD-OUT/2020 VI.E.166

Street Intersections VI.E.166
Transit VI.E.175
Rail Freight Facilities VI.E.178
  Alternatives A and B VI.E.178
  Alternative N VI.E.183

Maritime Facilities and Services VI.E.183
  Alternative A VI.E.183
  Alternative B VI.E.183
  Alternative N VI.E.184

Page

Parking VI.E.184
  Supply and Demand Rates VI.E.184
    Alternative A. VI.E.186
    Alternative B. VI.E.187
    Alternative N. VI.E.187

Pedestrians and Bicycles VI.E.187
Construction Traffic VI.E.188
Off-Street Freight Loading VI.E.189

IMPLICATIONS OF MISSION BAY ALTERNATIVES ON TRANSPORTATION PLANS AND POLICIES VI.E.190

I-280 Transfer Concept Program (TCP) VI.E.190
CalTrain Extension VI.E.191
MUNI Metro Extension VI.E.193
Rail Freight Service and Truck Access VI.E.193
Bicycles VI.E.194
Transportation Projects in the Bayshore Corridor VI.E.194
  Third Street VI.E.195
  MUNI Metro Service to the Bayshore Corridor VI.E.196

MITIGATION VI.E.198

Project-Related Measures, Year 2000 VI.E.199
  Roadway VI.E.199
  Transit and Ridesharing VI.E.201
  Rail Freight VI.E.205
  Parking VI.E.207
  Pedestrian/Bicycle VI.E.209
  Project-Related General VI.E.210

Regional / Cumulative Measures, Year 2000 VI.E.211

Reasonably Assured Capacity Improvements, 2000 VI.E.212
  Regional Highway Corridor - North Bay VI.E.212
  Regional Highway Corridor - East Bay VI.E.212
  Regional Highway Corridor - South Bay VI.E.212
  Regional Transit - North Bay VI.E.212
  Regional Transit - East Bay VI.E.212
  Regional Transit - South Bay VI.E.213
  Downtown & Vicinity - Transit VI.E.213

Measures for Consideration, 2000 VI.E.214
  Regional Highway and Transit - North Bay VI.E.214
  Regional Transit - East Bay VI.E.215
  Regional Transit - South Bay VI.E.216

MUNI - Downtown & Vicinity VI.E.217

YEAR 2020 MITIGATION VI.E.217

Page

Project-Related Measures, Build-Out/2020 VI.E.218
  Transit VI.E.219
  Rail Freight VI.E.221
  Parking VI.E.222
  Pedestrian/Bicycle VI.E.223

Regional/Cumulative Measures for Consideration, Build-Out/2020 VI.E.224
  Regional Highway and Transit Corridor - North Bay VI.E.225
  Regional Highway and Transit Corridor - East Bay VI.E.226
  Region Transit - South Bay VI.E.230
  Downtown & Vicinity VI.E.231

NOTES - Transportation VI.E.232

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
F. AIR QUALITY

Page

- SETTING VI.F.1
  - CLIMATE VI.F.1
  - AIR QUALITY VI.F.1
    - Air Quality Regulations and Standards VI.F.1
    - Regional and San Francisco Air Quality VI.F.3
      - Ozone (O_3) VI.F.3
      - Carbon Monoxide (CO) VI.F.4
        - Hot-Spot Monitoring. VI.F.5
      - Total Suspended Particulate (TSP) and Respirable Particulate (PM_{10}) VI.F.6
      - Nitrogen Oxides (NO_x) VI.F.6
      - Sulfur Dioxide (SO_2) VI.F.7
      - Project Area Emissions VI.F.7
      - Project Area Carbon Monoxide Levels VI.F.9
- IMPACT VI.F.11
  - DEMOLITION, EXCAVATION, AND CONSTRUCTION EMISSIONS VI.F.11
    - Fugitive Dust VI.F.11
    - Toxic Air Contaminants VI.F.12
    - Odors VI.F.12
  - BUILDING EMISSIONS VI.F.12
  - MOTOR VEHICLE EMISSIONS VI.F.13
    - Regional Air Quality VI.F.15
      - 2000 VI.F.15
        - Alternative A. VI.F.15
        - Alternative B. VI.F.15
        - Alternative N. VI.F.16
      - Build-Out/2020 VI.F.16
        - Alternative A. VI.F.16
        - Alternative B. VI.F.16
        - Alternative N. VI.F.16
    - Local Air Quality VI.F.17
      - 2000 VI.F.17
        - Alternative A. VI.F.17
        - Alternative B. VI.F.17
        - Alternative N. VI.F.19
      - Build-Out/2020 VI.F.19
        - All Alternatives. VI.F.19

Page

Consistency with the 1982 Bay Area Air Quality Plan VI.F.19

EMISSIONS FROM STATIONARY SOURCES VI.F.20

ODORS VI.F.20

Channel Street Pump Station VI.F.20
Bay Sediments VI.F.21
Build-Out/2020 VI.F.22
Alternative A. VI.F.22
Alternative B. VI.F.22
Alternative N. VI.F.22

MITIGATION VI.F.23

NOTES - Air Quality VI.F.26

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
G. NOISE

Page

SETTING VI.G.1

EXISTING NOISE SOURCES AND NOISE LEVELS VI.G.1

Noise Sources VI.G.1
Intrusive Noise VI.G.1
Background Noise VI.G.2
  Peak-Hour Traffic Noise VI.G.2
  Community Noise VI.G.3
Sensitive Receptors VI.G.7
Noise Standards, Plans and Policies VI.G.7
Title 24 Noise Insulation Standards. VI.G.7
San Francisco Noise Ordinance (Part II, Chapter VII, San Francisco Municipal Code). VI.G.8
Environmental Protection Element. VI.G.8

IMPACT VI.G.10

INTRODUCTION VI.G.10

CONSTRUCTION NOISE VI.G.11

Noise Sources VI.G.11
Alternative A VI.G.12
  Initial Phase of Development VI.G.16
Alternative B VI.G.17
  Initial Phase of Development VI.G.17
Alternative N VI.G.18

OPERATIONAL NOISE VI.G.19

Peak-Hour Traffic Noise VI.G.19
  Alternative A VI.G.22
  Alternative B VI.G.23
  Alternative N VI.G.23

Non-Traffic Noise VI.G.24
  Alternative A VI.G.24
  Alternative B VI.G.26
  Alternative N VI.G.27

NOISE STANDARDS, PLANS AND POLICIES VI.G.28

Title 24 Noise Insulation Standards VI.G.28
San Francisco Noise Ordinance VI.G.28
Environmental Protection Element VI.G.28

Page

MITIGATION VI.G.30

NOTES - Noise VI.G.35

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
H. ENERGY

Page

SETTING VI.H.1

LOCAL ENERGY SUPPLY AND DISTRIBUTION VI.H.1

Electricity VI.H.1
  Pacific Gas and Electric Company VI.H.1
  Hetch Hetchy Water and Power VI.H.2

Natural Gas VI.H.2
Steam VI.H.3
Liquid Fuels VI.H.3

ENERGY DEMAND AND CONSUMPTION VI.H.3

Electricity VI.H.3
Natural Gas VI.H.4
Transportation Energy VI.H.4

ALTERNATIVE ENERGY RESOURCES VI.H.5

ENERGY CONSERVATION POLICIES, REGULATIONS AND ORDINANCES VI.H.5

IMPACT VI.H.7

CONSTRUCTION ENERGY VI.H.7

2000 VI.H.7
  Alternative A VI.H.7
  Alternative B VI.H.7
  Alternative N VI.H.8

Build-Out/2020 VI.H.8
  Alternative A VI.H.8
  Alternative B VI.H.8
  Alternative N VI.H.8

OPERATIONAL ENERGY VI.H.8

2000 VI.H.9
  Alternative A VI.H.10
  Alternative B VI.H.11
  Alternative N VI.H.11

Build-Out/2020 VI.H.11
  Alternative A VI.H.12
  Alternative B VI.H.13
  Alternative N VI.H.13

Page

ENERGY CAPACITY AND INFRASTRUCTURE VI.H.13

2000 VI.H.14
  Electricity VI.H.14
  Natural Gas VI.H.15

Build-Out/2020 VI.H.15
  Electricity VI.H.15
  Natural Gas VI.H.16

TRANSPORTATION ENERGY VI.H.16

2000 VI.H.16
  Alternative A VI.H.16
  Alternative B VI.H.17
  Alternative N VI.H.18

Build-Out/2020 VI.H.18
  Alternative A VI.H.18
  Alternative B VI.H.19
  Alternative N VI.H.19

COMPLIANCE WITH ENERGY REGULATIONS AND OBJECTIVES VI.H.20

MITIGATION VI.H.21

NOTES - Energy VI.H.26

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
I. ARCHITECHTURAL RESOURCES AND URBAN DESIGN

Page

SETTING VI.I.1

ARCHITECTURAL RESOURCES VI.I.1

Architectural Surveys in San Francisco VI.I.1
Architectural Resources in the Mission Bay Project Area VI.I.4
Historic and Architectural Resources in the Vicinity VI.I.4

VISUAL QUALITY VI.I.5

Views from Potrero Hill VI.I.5
Views from Other Areas VI.I.6

URBAN DESIGN VI.I.6

Urban Design Features VI.I.6
Third and Townsend Streets VI.I.11
Berry Street Near Fourth Street VI.I.14
China Basin Channel Near Fourth Street VI.I.14
Third, Fourth and Mission Rock Streets VI.I.15
Former Southern Pacific Railyards VI.I.15
Owens Street North of 16th Street VI.I.15
Urban Design Plan VI.I.18

IMPACT VI.I.24

ARCHITECTURAL RESOURCES VI.I.24

Build-Out/2020 VI.I.24
Alternative A VI.I.25
Alternative B VI.I.25
Alternative N VI.I.25

VISUAL QUALITY VI.I.26

Build-Out/2020 VI.I.26
Alternative A VI.I.26
Views from Potrero Hill. VI.I.26
Views from Other Areas and the Bay. VI.I.32
Alternative B VI.I.33
Views from Potrero Hill. VI.I.33
Views from Other Areas and the Bay. VI.I.34
Alternative N VI.I.34
Views from Potrero Hill. VI.I.35
Views from Other Areas and the Bay. VI.I.36

Page

URBAN DESIGN VI.I.37

Build-Out/2020 VI.I.37
  Viewpoint 1 - Third and Townsend Streets VI.I.37
    Alternative A. VI.I.37
    Alternative B. VI.I.40
    Alternative N. VI.I.40

  Viewpoint 2 - Berry Street Near Fourth Street VI.I.41
    Alternative A. VI.I.41
    Alternative B. VI.I.41
    Alternative N. VI.I.41

  Viewpoint 3 - China Basin Channel Near Fourth Street VI.I.44
    Alternative A. VI.I.44
    Alternative B. VI.I.44
    Alternative N. VI.I.45

  Viewpoint 4 - Third, Fourth and Mission Rock Streets VI.I.45
    Alternative A. VI.I.45
    Alternative B. VI.I.45
    Alternative N. VI.I.50

  Viewpoint 5 - Former Southern Pacific Railyards VI.I.50
    Alternative A. VI.I.50
    Alternative B. VI.I.50
    Alternative N. VI.I.50

  Viewpoint 6 - Owens Street North of 16th Street VI.I.51
    Alternative A. VI.I.51
    Alternative B. VI.I.51
    Alternative N. VI.I.51

SHADOW VI.I.51

Build-Out/2020 VI.I.51
  Alternative A VI.I.57
    China Basin Park. VI.I.60
    North of Channel. VI.I.60
    South of Channel. VI.I.60
    North-South Corridor. VI.I.61
    Northwest-Southeast Corridor. VI.I.61
    16th Street Park. VI.I.61
    Central Square. VI.I.61
    Michigan Street Corridors. VI.I.62
    Shadow Conditions for 40-foot Buildings. VI.I.62

  Alternative B VI.I.62
    China Basin Park. VI.I.62
    North of Channel. VI.I.65
    South of Channel. VI.I.65
    Central Square. VI.I.65

Page

Central Corridor. VI.I.66
Bayshore Park. VI.I.66
Shadow Conditions for 40-foot Buildings. VI.I.66

Alternative N VI.I.66
North of Channel. VI.I.66
South of Channel. VI.I.69
Shadow Conditions for 40-foot Buildings. VI.I.69

WIND VI.I.69

Wind Conditions in San Francisco VI.I.69
Pedestrian Comfort and Wind Criteria VI.I.70
Build-Out/2020 VI.I.70
Wind Effects in Mission Bay VI.I.70

MITIGATION VI.I.72

ARCHITECTURAL RESOURCES VI.I.72

URBAN DESIGN VI.I.72

SHADOWS VI.I.73

WIND VI.I.74

NOTES - Architectural Resources and Urban Design VI.I.76

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
J. CULTURAL RESOURCES

Page

SETTING VI.J.1

PREHISTORY VI.J.1

Prehistoric Period, 2500 B.C. to 1500 A.D. VI.J.1
Protohistoric Period, 1500s to 1770s VI.J.1

HISTORY VI.J.2

The Spanish/Mexican and Gold Rush Eras, 1770s to 1860s VI.J.2
The Origins and Evolution of a Pioneer Industrial Area, Mid-1860s to 1900 VI.J.4
The Decline of Industrial Diversity: The Twentieth Century VI.J.10

IMPACT VI.J.14

POTENTIAL ARCHAEOLOGICAL AND HISTORIC RESOURCES VI.J.14

Prehistoric Archaeological Resources VI.J.14
Historic Archaeological Resources VI.J.15
Historic Structures VI.J.15

POTENTIAL FOR SIGNIFICANT RESOURCES VI.J.16

BUILD-OUT/2020 VI.J.19

Alternative A VI.J.19
Initial Phase of Development VI.J.19
Alternative B VI.J.20
Initial Phase of Development VI.J.20
Alternative N VI.J.21

MITIGATION VI.J.22

HISTORIC ARCHAEOLOGIC RESOURCES VI.J.22

HISTORIC STRUCTURES VI.J.25

OTHER CULTURAL RESOURCES VI.J.27

NOTES - Cultural Resources VI.J.28

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
K. GEOLOGY AND SEISMICITY

Page

SETTING VI.K.1

DATA REVIEW AND SITE RECONNAISSANCE VI.K.1

Surface Topography and Geologic Materials VI.K.1
Surface Features VI.K.1
Geologic Structure and Materials VI.K.1

Geologic Site Development Constraints VI.K.7
Settlement VI.K.7
Ground Failure VI.K.10
Mud Waves VI.K.10
Ground Water Level VI.K.11

Seismic Hazards VI.K.11
Faulting and Earthquakes VI.K.11
Groundshaking VI.K.13
Ground Failure VI.K.14

Tsunami and Seiches VI.K.15

CITY AND COUNTY SEISMIC SAFETY MEASURES AND POLICIES VI.K.16

Office of Emergency Services VI.K.16
Seismic Investigation and Hazard Survey Advisory Committee (SIHSAC) VI.K.17

IMPACT VI.K.19

TOPOGRAPHY AND GRADING VI.K.19

Surcharging VI.K.21
Disposal of Excavated Material VI.K.22
Alternative A VI.K.22
Initial Phase of Development. VI.K.22
Alternative B VI.K.23
Initial Phase of Development. VI.K.23
Alternative N VI.K.23

GEOLOGIC SITE DEVELOPMENT CONSTRAINTS VI.K.24

Areal Settlement and Foundation Types VI.K.24
Differential Settlement VI.K.29
Mud Waves VI.K.30
Groundwater Levels VI.K.30
Corrosive Soils VI.K.31
Alternative A VI.K.31
Initial Phase of Development. VI.K.31

Page

Alternative B VI.K.32
Initial Phase of Development. VI.K.32
Alternative N VI.K.32

CONSTRUCTION HAZARDS VI.K.32

SEISMIC HAZARDS VI.K.33

Groundshaking VI.K.33
Ground Failure VI.K.34
Building Types VI.K.35
Damage to Infrastructure VI.K.35
Affected Population VI.K.37
Alternative A VI.K.42
Initial Phase of Development. VI.K.42
Alternative B VI.K.42
Initial Phase of Development. VI.K.43
Alternative N VI.K.43
Tsunami and Seiches VI.K.44

MITIGATION VI.K.45

GEOLOGIC SITE DEVELOPMENT CONSTRAINTS VI.K.45

Areal and Differential Settlement VI.K.45
Groundwater Levels VI.K.49
Corrosive Soils VI.K.49

SEISMIC HAZARDS VI.K.50

Groundshaking VI.K.50
Ground Failure VI.K.52
Emergency Response VI.K.52
Damage to Infrastructure VI.K.54

NOTES - Geology and Seismicity VI.K.57

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
L. HYDROLOGY AND WATER QUALITY

Page

SETTING VI.L.1

HYDROLOGIC HISTORY VI.L.1

WATER QUALITY MANAGEMENT POLICIES FOR THE PROJECT AREA VI.L.1

Beneficial Uses - Central San Francisco Bay VI.L.2

RUNOFF VI.L.3

Site Drainage Characteristics VI.L.3
Runoff Quality VI.L.4

FLOODING VI.L.4

GROUNDWATER VI.L.4

UNDERGROUND STORAGE TANKS VI.L.5

CHINA BASIN CHANNEL VI.L.6

Hydrology VI.L.6
Water Quality VI.L.6
Sewage/Stormwater Overflows VI.L.7
Sampling of Overflows VI.L.7
Impacts of Overflows on Water Quality VI.L.8
Impacts of Overflows on Sediment Quality VI.L.10
Ongoing Water Quality Sampling VI.L.10
Houseboats VI.L.11
Sediment Characteristics in the Channel VI.L.11

IMPACT VI.L.13

CONSTRUCTION VI.L.13

Alternative A VI.L.14
Alternative B VI.L.14
Alternative N VI.L.14

SURFACE RUNOFF VI.L.15

Runoff Amounts and Quality VI.L.15
Alternative A VI.L.18
Alternative B VI.L.18
Alternative N VI.L.18

FLOODING VI.L.19

Page

GROUNDWATER VI.L.19

Groundwater Levels VI.L.19
Groundwater Quality VI.L.19
Alternative A VI.L.21
Alternative B VI.L.21
Alternative N VI.L.22

CHINA BASIN CHANNEL VI.L.22

Water Quality VI.L.22
Alternative A VI.L.23
Hydrologic Characteristics. VI.L.23
Water Quality Effects of Wet Dredging. VI.L.24
Regulation of Dredge Spoils Disposal. VI.L.25
Public Use of China Basin Channel. VI.L.27
Initial Phase of Development. VI.L.28

Alternative B VI.L.28
Hydrologic Characteristics. VI.L.28
Water Quality Effects of Wet-Dredging. VI.L.29
Public Use of China Basin Channel. VI.L.29
Initial Phase of Development. VI.L.29

Alternative N VI.L.29

DEVELOPMENT OF WETLANDS VI.L.30

Alternative A VI.L.30

Alternative B VI.L.30
Hydrologic Characteristics VI.L.30
Water Quality VI.L.30
China Basin Wetland VI.L.33
Mid-Channel Wetland VI.L.33
Bayfront Wetland VI.L.33

Alternative N VI.L.34

MITIGATION VI.L.35

NOTES - Hydrology and Water Quality VI.L.40

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
M. VEGETATION AND WILDLIFE

Page

SETTING VI.M.1

- Vegetation VI.M.1
- Wildlife VI.M.2
- Aquatic Habitat VI.M.4

IMPACT VI.M.7

- TERRESTRIAL AND WETLAND VEGETATION / WILDLIFE VI.M.7
  - Alternative A VI.M.7
    - Initial Phase of Development VI.M.9
  - Alternative B VI.M.9
    - Initial Phase of Development VI.M.12
  - Alternative N VI.M.13
- AQUATIC LIFE VI.M.14
  - Alternative A VI.M.14
    - Initial Phase of Development VI.M.17
  - Alternative B VI.M.17
    - Initial Phase of Development VI.M.20
  - Alternative N VI.M.20

MITIGATION VI.M.21

- TERRESTRIAL AND WETLAND VEGETATION / WILDLIFE VI.M.21
- AQUATIC LIFE VI.M.25

NOTES - Vegetation and Wildlife VI.M.26

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
N. HAZARDOUS WASTES

Page

SETTING VI.N.1

REGULATORY FRAMEWORK VI.N.1

San Francisco Fire Code VI.N.1
San Francisco Public Works Code VI.N.2
San Francisco Bay Regional Water Quality Control Board (RWQCB) VI.N.3
Department of Health Services VI.N.3
U.S. Environmental Protection Agency VI.N.4

SITE HISTORY VI.N.5

Filling of Mission Bay VI.N.5
Progression of Fill and Fill Materials VI.N.5
Soil Borings VI.N.7

Underground Facilities VI.N.8

Historic Industries VI.N.9
Petroleum Processing and Storage. VI.N.10
Paint Products. VI.N.10
Glass Manufacturing. VI.N.11
Chemical Manufacturing. VI.N.11
Shipyards. VI.N.12
Steel Mills. VI.N.13
Asbestos. VI.N.13
Rail Facilities. VI.N.13

Hazards from Existing Industries VI.N.14
Permitted TSD Facilities VI.N.14
Potentially Hazardous Industries VI.N.14
Surface Conditions VI.N.16

IMPACT VI.N.18

HAZARDOUS WASTE POTENTIAL VI.N.21

Potential Sources of Hazardous Materials in the Project Area VI.N.21

Potential Types of Hazardous Materials in the Project Area VI.N.21
Reactive Materials VI.N.25
Ignitable Materials VI.N.25
Corrosive Materials VI.N.26
Toxic Materials VI.N.26

Environmental Fates of Hazardous Materials VI.N.26

Page

CLEAN-UP OF HAZARDOUS MATERIALS VI.N.27

Public Health Risk VI.N.32
  Sensitive Receptors VI.N.32
  Types of Health Risks VI.N.32

2000 VI.N.34
  Alternative A VI.N.34
    Initial Phase of Development. VI.N.35
  Alternative B VI.N.35
    Initial Phase of Development. VI.N.36
  Alternative N VI.N.36

Build-Out/2020 VI.N.37
  Alternative A VI.N.37
  Alternative B VI.N.38
  Alternative N VI.N.38

MITIGATION VI.N.39

HAZARDOUS WASTE POTENTIAL VI.N.39
  Clean-up of Hazardous Materials VI.N.39

NOTES - Hazardous Wastes VI.N.46

VI. ENVIRONMENTAL SETTING, IMPACT AND MITIGATION
O. GROWTH INDUCEMENT

Page

IMPACT VI.O.1

NET ADDITION VI.O.1

Net Addition of Business Activity and Employment VI.O.2
Net Addition of Housing and Population VI.O.2

RELATIONSHIP BETWEEN EMPLOYMENT GROWTH AND POPULATION VI.O.5

MULTIPLIER EFFECTS VI.O.7

SPILLOVER EFFECTS IN NEARBY AREAS VI.O.8

VII. VARIATIONS ON ALTERNATIVES

Page

1. HOUSING DEVELOPMENT (ALTERNATIVE N) VII.1

2. PORT-PRIORITY RETENTION (ALTERNATIVE B) VII.10

3. REDUCED HOUSING DENSITY (ALTERNATIVE B) VII.19

4. REPLACEMENT OF SOME S/LI/RD WITH PERSONAL AND BUSINESS SERVICE SPACE AND INCREASED RETAIL AND COMMUNITY FACILITIES (ALTERNATIVE A) VII.24

5. REPLACEMENT OF SOME S/LI/RD WITH OFFICE (ALTERNATIVE A) VII.32

6. INCREASED HOUSING HEIGHTS (ALTERNATIVE B) VII.37

7. OFFICE AS A PRIMARY USE IN S/LI/RD DEVELOPMENT (ALTERNATIVE A AND B) VII.41

8. VARIATIONS IN THE PERCENTAGE OF AFFORDABLE HOUSING AND THE SIZE OF AFFORDABLE UNITS (ALTERNATIVES A AND B) VII.47

9. CALTRAIN STATION LOCATION (ALTERNATIVES A AND B) VII.51

10. REDUCED SEISMIC HAZARD (ALL ALTERNATIVES) VII.54

NOTES - Variations on Alternatives VII.56

Page

VIII. UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS VIII.1

IX. SHORT-TERM VS. LONG-TERM IMPLICATIONS IX.1

X: SIGNIFICANT ENVIRONMENTAL CHANGES X.1

XI. REPORT AUTHORS & PERSONS CONSULTED XI.1

XII. DISTRIBUTION LIST XI.1

XIII. BIBLIOGRAPHY AND REPORT OUTLINE XIII.1

No 20753 · 1